

MAY 16 1936

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NEW SERIES
VOL. 83, No. 2159

FRIDAY, MAY 15, 1936

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ROCHESTER, N. Y.

SCIENCE

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SCIENCE: A Weekly Journal devoted to the Advancement of Science, edited by J. McKEEN CATTELL and published every Friday by

THE SCIENCE PRESS

New York City: Grand Central Terminal
Lancaster, Pa. Garrison, N. Y.
Annual Subscription, \$6.00 Single Copies, 15 Cts.

SCIENCE is the official organ of the American Association for the Advancement of Science. Information regarding membership in the Association may be secured from the office of the permanent secretary, in the Smithsonian Institution Building, Washington, D. C.

THE AMERICAN ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

PRELIMINARY ANNOUNCEMENT OF THE ROCHESTER MEETING

Edited by Dr. HENRY B. WARD
PERMANENT SECRETARY

ROCHESTER, NEW YORK, is to welcome the association on Tuesday, June 16, 1936, for a three-day session, terminating there on Thursday evening, June 18, when the association adjourns to convene again the following day in Ithaca for the remainder of the summer meeting. This unusual arrangement was entered into because of the semi-centennial of Sigma Xi, which had invited the association to designate this event as an integral part of the summer meeting for 1936. This is the ninety-eighth meeting of the association and the second to be held in Rochester, for the forty-first meeting in August, 1892, was in the same city. It is also the second to be held at Ithaca, as the fifty-sixth meeting was held there in June, 1906.

The first meeting in Rochester was held in August, 1892, and was the forty-first in the record of the association. On that occasion three famous geologists are listed among the officers of the meeting: Professor Joseph Le Conte, of the University of California, was president of the association; among the vice-presidents was Professor H. S. Williams, of Cornell, often spoken of as the founder of Sigma Xi, and Professor H. L. Fairchild served as local secretary. For the coming meeting Professor Fairchild has been given the place of honorary chairman; Professor J. Edward Hoffmeister is chairman, Dr. W. R. Line, secretary, and R. L. Thompson, treasurer. On the general committee some thirty members of the faculty of the University

of Rochester and leaders in civic life of the city are organized in various subcommittees to perfect arrangements for the activities of the meeting.

THE ROCHESTER REGION

(Material furnished by the Local Committee)

The city of Rochester, with a population of about 400,000, is located at the falls of the Genesee River, extending along its banks for about ten miles to its mouth on Lake Ontario. It is in many ways an ideal location for a summer meeting because of its normally mild summer climate and its location within easy reach of the Lake Ontario beaches, the famous Finger Lake region, and other points of scenic interest, such as Niagara Falls and the Letchworth State Park.

Within the city the visitor will find many points of interest. One of the chief of these is the Genesee River, which at the south end of the city crosses the New York State Barge Canal. A barge channel is maintained along the river to the center of the city at the Court Street dam. At this point the river enters a rocky bed, passes over five waterfalls, then flows in a deep gorge through the northern part of the city to its mouth on Lake Ontario. Two city parks, Maplewood Park and Seneca Park, are maintained on opposing banks of this gorge, connected by the beautiful Veterans Memorial Bridge spanning the gorge 200 feet above the river. At the mouth of the river is located Ontario Beach Park with a fine public bathing beach. Further east on the lake shore is located Durand Eastman Park with a bathing beach and public golf course. There are many other city parks, some of which have noted floral displays. Highland Park, a few minutes' drive from the University River Campus, contains 3,900 varieties of trees, shrubs and perennials, including an unusual display of lilacs, peonies, azaleas and other flowers. Genesee Valley Park, located on the Genesee River adjacent to the River Campus, is equipped with a public golf course, playgrounds and picnic sites.

Industrially the city of Rochester is of unique interest to scientists, being the home of the Eastman Kodak Company, the Bausch and Lomb Optical Company, Taylor Instrument Companies, the Ward Natural Science Museum, the Stromberg Carlson Radio Company and other scientific centers. Excursions will be arranged to the factories and research laboratories of most of these companies.

Within easy reach of Rochester there are many points of unusual scenic and historic interest. To the south and west of Rochester lies the heart of the famous Finger Lakes region, less than an hour's drive from the city. This region contains six large lakes, varying from eleven to forty miles in length, together with numerous smaller lakes. These are surrounded

by a rugged wooded region, with many hills rising to an altitude of over 2,300 feet. There are nine state parks in this region, covering more than 5,000 acres and containing many gorges, waterfalls and other points of unusual scenic interest. There are 1,000 waterfalls in the region, one of them being over two hundred feet high. Visitors driving from Rochester to Ithaca will pass through the heart of this region and will find it worth their while to arrange a tour which will take them through Bristol Hills district, Watkins Glen, Taughannock Falls and other points.

Fifty miles south of Rochester, on the upper Genesee River, is located Letchworth State Park, containing some of the most notable waterfalls and river gorge scenery in eastern United States. The park contains many camping and picnic sites and a museum of Indian relics.

Many visitors will be interested to plan their trip in such a way as to include Niagara Falls and Buffalo, ninety miles west of Rochester, or the St. Lawrence district and the Thousand Islands, about one hundred and fifty miles to the northeast. The mountainous regions of southern New York State and northern Pennsylvania offer many attractions and tempting camping sites for the tourist on vacation. Complete information and road maps for visitors who are planning automobile tours may be obtained by writing to J. Allan Doyle, Rochester Convention Bureau.

THE UNIVERSITY OF ROCHESTER

The University of Rochester, which will be host to these meetings, is a non-denominational, privately endowed institution organized in 1850. As a result of generous gifts of the late George Eastman and of an extensive endowment campaign in 1920 the university has undertaken a considerable expansion of its activities since that time. It now consists of the College of Arts and Science, the Eastman School of Music and the School of Medicine and Dentistry. The College of Arts and Science is subdivided into a College for Men and a College for Women, with separate campuses. The old campus, located on University Avenue at Prince Street, now houses the College for Women and contains many fine buildings, both old and new, including a Memorial Art Gallery.

Most of the association section meetings will be held on the River Campus of the College for Men. This campus, which was first occupied in 1930, is located on a beautiful site overlooking the Genesee River and includes an exceptionally fine group of modern college buildings. Most of the science research laboratories are located on this campus, as well as the beautiful Rush Rhees Library. The men's dormitories, where some of the visitors may be housed, are located here, as well as Todd Union, where meals will be served.

The facilities of the new men's gymnasium and swimming pool will be available to visiting scientists. The research laboratories of the science departments will be open for inspection, and guides will be provided for those who wish to visit points of interest on the campus.

The School of Medicine occupies a new group of buildings located within five minutes' walk of the River Campus. These buildings were erected in 1924 at the time the Medical School was organized and contains some of the most modernly equipped medical research laboratories in the country. The Strong Memorial Hospital of the University of Rochester and the Rochester Municipal Hospital are included in the group. A number of the meetings of the Section on Medical Sciences will be held at the Medical School, where cafeteria service is also available.

The Eastman School of Music occupies a group of buildings in the downtown section, including the beautiful Eastman Theater, in which the general meetings which are open to the public will be held.

SIGMA XI SEMI-CENTENNIAL

On Friday morning members of the association and its associated societies will proceed to Ithaca, N. Y., in such manner as meets with personal approval. Railroad and bus service as well as private autos may be utilized. Full information will be available at registration desks, where a representative of the Sigma Xi Society will be in attendance. Those desiring to participate should make arrangements at an early date in order to insure the best service. Secretary Ellery, of Sigma Xi, writes, "It is the desire and hope of Sigma Xi that all members of the A. A. A. S. and associated societies will find it possible to attend the meetings and other events scheduled for Ithaca."

The American Association for the Advancement of Science will thus join the Society of Sigma Xi in celebrating at Cornell University on June 19 and 20 the fiftieth anniversary of the founding of the society. The program will be comprised of three sessions—Friday afternoon and evening, and Saturday forenoon.

The Friday afternoon program will include an address on "The Service of Sigma Xi in the Universities of the Future," by President Karl T. Compton, of the Massachusetts Institute of Technology. On Friday evening the Semi-Centennial address will be given by President Max Mason, of the Rockefeller Foundation, on "Science and the Rational Animal."

On Saturday morning, after presentation of the Semi-Centennial awards two addresses will be given, on "Accomplishments and Future of the Physical Sciences," by Dr. Willis R. Whitney, in charge of research of the General Electric Company, and "Accomplish-

ments and Future of the Biological Sciences," by Dr. Frank R. Lillie, president of the National Academy of Sciences and chairman of the National Research Council.

Two additional items in the celebration will be of especial interest to members of Sigma Xi. On the afternoon of June 19 there will be held a reception in honor of the surviving founders of Sigma Xi, to whom special invitations to attend the celebration have been sent. During the program on the morning of the 20th, there will be unveiled a tablet erected at Cornell University by the Society of Sigma Xi to commemorate the founding of the society. A large number of delegates from the several chapters and many invited guests will attend the celebration.

Cornell University has provided for the accommodation of guests by opening its residential halls. Requests for reservations should be sent at an early date to Professor C. C. Murdock, Department of Physics, Cornell University, Ithaca, N. Y. Meals will be served at Willard Straight Hall, the student union on the Cornell campus. The Cornell Chapter of Sigma Xi will present a complimentary buffet dinner to delegates and guests on the evening of June 19.

PRESS SERVICE

(From Austin H. Clark, Director)

Representatives of all sections of the press are co-operating with the association for the purpose of making known throughout the entire country, and also abroad, the proceedings of the Rochester meeting.

We who are occupied with science in this country receive our support directly or indirectly from the American public. Year by year the public is becoming increasingly interested in what we are doing. Their knowledge of what we are doing comes to them through the medium of the press. So it is incumbent upon the members of the association to provide the press with all the material it may wish to use.

All who will present papers or addresses at Rochester are requested to make sure that the Press Service is supplied with copies of their manuscripts as long in advance as possible. Two copies of each paper, each accompanied by an abstract, should be sent to the Press Service at Washington.

Manuscripts are made available for study by the representatives of the press as soon as received. The earlier they are received the more time there is to study them and to prepare full and accurate accounts of their contents. Early receipt of manuscripts is of great benefit and advantage to all concerned—especially the authors.

The Press Service is for your benefit, as well as for the benefit of the association and of science as a whole. Its success depends upon your cooperation.

HEADQUARTERS AND REGISTRATION

General headquarters for the meeting and the main registration office will be in the Museum, Dewey Building, River Campus, University of Rochester. This building is readily reached from other buildings on the campus and will be a convenient gathering place for members attending the meeting. The office of the permanent secretary will also be located in this building. A branch registration office will be in operation in the main lobby of Strong Memorial Hospital, where sessions of societies related to medical sciences will be held. Officers of the association will be quartered in the Hotel Seneca, which will be the hotel headquarters. Further information regarding hotels and other living quarters in Rochester will be found in *SCIENCE* for April 17, 1936. Mail, telegrams, etc., may if desired be addressed to Registration Headquarters, A. A. A. S., Dewey Building, River Campus, University of Rochester.

Registration will be open upon payment of a fee of \$1.00 to all persons who are interested in the advance of science and education. Each registrant receives a copy of the program, identification card and badge. Registration will be necessary for attendance upon the general reception, participation in excursions and other events.

For the convenience of those arriving early, a registration desk will be in operation in the Hotel Seneca on Monday afternoon from 2:00 to 5:00 o'clock. The registration offices on River Campus will be open at 9:00 A. M., on Tuesday, and will remain in operation throughout the period of the meeting.

TRANSPORTATION

No arrangements will be made for reduced railroad rates on the convention plan. This is due in part to the confused situation in connection with the proposed reduction of the regular rates now being considered by a number of the Eastern railroads. It is therefore advisable for all who are planning to attend the Rochester meeting to consult their local ticket agent for information regarding the possibility of summer excursion fares and other reduced rates. Members are urged to bear in mind the Semi-Centennial celebration of the Society of the Sigma Xi and if possible to have their tickets routed through Ithaca with stop-over for this event after the sessions at Rochester.

GENERAL SESSIONS

The evening general sessions will be held in the Eastman Theater, which is located down town within easy reach of the hotels. It is a finely equipped and beautiful music hall and motion picture theater, seating over 3,000 people and admirably adapted for the larger audiences of the general sessions and for the reception on Wednesday evening.

Dr. C. E. K. Mees, director of research, Eastman Kodak Company, has consented to address the general session on Tuesday evening on "Color Photography." The lecture will be illustrated with both lantern slides and motion pictures, demonstrating the most recent developments in the use of color in this field.

The Maiben Lecture for 1936 will be given on Wednesday evening by Dr. Charles Camsell, deputy minister of mines for the Dominion of Canada. Dr. Camsell has been for many years a leader in scientific work; he is a former president of the Royal Society of Canada, well known by his geological researches and writings and welcomed at scientific conferences at home and abroad. The lecture will be an illustrated address on a four-thousand-mile flight over northwestern Canada that Dr. Camsell made in August, 1935. The important observations made at that time were mainly geographical and concern the northern termination of the Rocky Mountain system. The address, while non-technical in character, contains new and significant data on a cross-section of the Canadian Cordillera. The speaker is well known in our sister nation as a leader in research and in public address.

Dr. Carl Snyder, who was retiring vice-president last year of the Section on Social and Economic Sciences, was prevented by illness from presenting his address at Saint Louis. He has been for many years statistician of the Federal Reserve Bank of New York and was formerly president of the American Statistical Association. His address as retiring vice-president will be given on Thursday evening on the subject "The Rôle of Capitalism in Civilization."

The Ecological Society of America is sponsoring the general symposium for the Rochester meeting on the topic, "Scientific Aspects of Flood Control." This will be covered by speakers on three general headings which indicate the chief aspects of the problem: "Forestry in Relation to Flood Control"; "Land Use in Relation to Flood Control"; "Engineering in Relation to Flood Control." Men of scientific standing and national repute will discuss the question, but it is not possible to announce names of speakers at this date.

The general subject constitutes one of the most pressing problems in the field of conservation and touches the field of ecology and different sections of the association at many points. In the light of recent events the subject has special significance for the country at the present time. Both the scientifically trained public and those who are not technically informed are deeply concerned in ascertaining the facts in the case, in learning what has been done to solve the problem and what further measures must be undertaken to prevent future disasters. The symposia will be held in the Strong Auditorium on the River Campus on Thursday afternoon at 3.

Various societies and sections have adjusted their

programs to avoid conflicts and permit wide general participation in this consideration of a great public problem on a strictly scientific basis.

Last fall the Bausch and Lomb Optical Company of Rochester communicated to the executive committee that at about the time of the meeting in Rochester the 250,000th microscope would appear from their plant. They suggested that the association might like to cooperate in awarding the microscope to some investigator who had done outstanding work in one of the biological sciences. It was suggested that a committee be appointed to consider the selection of some living American scientist who had made an outstanding contribution for the welfare of mankind through the use of the microscope as a tool in his researches. The matter was discussed very fully by the executive committee, and it was voted to approve the general plan and incorporate the event in the program of the Rochester meeting. As a result of conferences and correspondence the subcommittee reported to the executive committee in April, recommending that the award of the microscope be made to Dr. F. G. Novy, of the University of Michigan, in view of the fundamental significance of the researches he had made. The report was approved and unanimously adopted.

The Bausch and Lomb Optical Company has invited the association to a complimentary luncheon at the Oak Hill Country Club on Thursday noon. It seemed appropriate to have the award presented to the recipient at that time. Dr. E. G. Conklin, the president of the association, will preside and will introduce Mr. Edward Bausch, who will make the presentation. Dr. Novy has consented to be present and to make a brief talk on some of the results of microscopic research which have been of specific significance for human welfare. Members and visitors will secure cards of admission at the time of registering in Rochester.

SOCIAL EVENTS

Following the Maiben Lecture on Wednesday evening, President Alan Valentine and the trustees of the University of Rochester will give an informal reception to visiting scientists in honor of the officers and members of the American Association.

The Section on Geology and Geography is planning a special luncheon on Wednesday, with short talks in recognition of the Centennial of the New York State Geological Survey.

On Wednesday evening a dinner for the bacteriologists is contemplated. Other groups are considering similar special luncheons or dinners, concerning which further information will be given in the printed program or can be obtained on registration in Rochester.

On Tuesday noon a luncheon meeting of the Section on Social and Economic Sciences will be held at the Rochester Chamber of Commerce. The speaker

will be Mr. Harper Sibley, president of the U. S. Chamber of Commerce; he will speak on "Individual Initiative versus Government Control in Community Organization."

EXCURSIONS, FIELD TRIPS AND DEMONSTRATIONS

The region about Rochester offers special attractions for field studies in natural history, and sections and societies are planning to take advantage of the opportunities offered. Many field trips are already organized in geology, botany and anthropology, and by various special groups. Precise data regarding these items, some of which are optional and some of which are necessarily limited to special groups or in number of participants, will be obtainable on registration in Rochester. The local committee has given special attention to organizing these trips and providing for their guidance. If the number and interest warrant, the Section on Anthropology will arrange a visit to a neighboring reservation of the Six Nations. The Association of Official Seed Analysts of North America will have excursions to trial grounds and seed establishments in the vicinity of Rochester.

The laboratories and plants of the chief industrial concerns in Rochester have arranged for visits and inspection of their facilities and products at different times during the meetings, so that individual groups may enjoy better opportunities than could be had through a single inspection by a larger body of visitors. This will also enable special society groups to give attention to those features of more particular interest in any industry. Registration for such trips will be arranged after arrival in Rochester.

Some exhibits and demonstrations are being planned by various societies and incorporated in their programs. Special notice should be given to exhibits in bacteriology by the department at the University of Rochester and to exhibits and demonstrations by the Rochester Section of the International Association for Dental Research, which are sponsored by both groups giving the dental program.

OFFICIAL NOTICES

The executive committee of the association will meet on Monday afternoon and evening and the council will hold its first session on Tuesday morning at 9. Later sessions will be held at the same hour on other days as decided. By rule all business is presented to the council through the executive committee. Members are requested to forward items for the council to the permanent secretary's office in Washington on or after June 10 to the Hotel Seneca, Rochester.

Full data regarding participants, time and place of various events and other details will be found in the official program of the meeting, which will be distributed to members on registration in Rochester.

SECTION MEETINGS AND SOCIETY PROGRAMS

The Section on Mathematics (A) will hold a session on Thursday. Among the speakers will be Professor Cassius J. Keyser, of Columbia University, on "The Rôle of Infinity in the Cosmology of Epicurus," and Professor Temple R. Hollcroft, of Wells College, on "Curves on Algebraic Surfaces."

The Section on Physics (B) has arranged three joint symposia. On Tuesday morning the symposium will be a joint one with the Section on Geology and Geography, on problems of common interest to physics and geology, mainly concerned with recent developments in radioactive age determinations and geothermal studies, with papers by Dr. R. D. Evans and Dr. W. D. Urry, of the Massachusetts Institute of Technology, and others to be announced. On Wednesday morning the symposium will be a joint meeting with the American Meteorological Society, on mass air analysis and its application in weather forecasting. It is expected that Dr. W. R. Gregg, of the U. S. Weather Bureau, Dr. H. C. Willett, of the Massachusetts Institute of Technology, and others will participate. The symposium should be of great interest to all those wishing to gain information concerning the new developments in weather forecasting based on the work of Professor Bjerknes, of Norway. The third symposium on Thursday morning will be on the subject of physiological effects of radiations. Among the speakers expected to participate are Dr. B. M. Duggar, of the University of Wisconsin, Dr. D. W. Bronk, of the University of Pennsylvania, and Dr. B. O'Brien, of the University of Rochester. Afternoon excursions will be arranged to the plants of the Eastman Kodak and Bausch and Lomb Optical Companies. During the meetings it is expected that a high altitude balloon will be released by Dr. L. F. Curtiss, of the National Bureau of Standards, in cooperation with the Institute of Optics of the University of Rochester. The balloon will be of a type recently developed at the Bureau of Standards and equipped for sending data to the ground on temperature and barometric pressure by radio signals. It is expected that it will carry photographic plates for the registration of high energy cosmic rays.

The American Meteorological Society plans to have meetings on Tuesday and Wednesday. Papers given on Tuesday morning will include one by Dr. K. O. Lange, of Harvard University, on "Radio Meteorography," and one on "The Solar Climate of Madison, Wisconsin," by Eric Miller. An outstanding feature of the program will be a lecture by Dr. Bradford Noyes, Jr., of the Taylor Instrument Companies, on thermometers. A trip to the laboratories of the Taylor Instrument Companies is planned for Tuesday afternoon. On Wednesday a joint symposium with the

Section on Physics will be held, on the subject of air mass analysis and its application in weather forecasting.

The Section on Chemistry (C) celebrates its fifty-fifth anniversary in Rochester, the city in which one of its founders and most active proponents formerly lived and worked. In 1873 at a meeting of the association being held in Newport, R. I., a group of chemists formed themselves into a committee, with Professor Samuel P. Lattimore, first professor of chemistry at the University of Rochester, as chairman, and asked permission of the officers of the association to form a subsection of chemistry within Section A. This was granted. The subsection developed so rapidly that by 1881 chemistry was made Section C of the association. The action of the committee, headed by Professor Lattimore, marked the first step in a nation-wide organization of American chemists. It is of interest to note that the meetings of the section will be held this June in the fine chemical laboratory at the University of Rochester, which bears the name of one of its illustrious founders, Samuel P. Lattimore. According to present plans the meetings of the section will cover two days, Wednesday and Thursday. Wednesday morning will be devoted to a symposium on immuno-chemistry. Dr. A. B. Hooker, of Evans Memorial Hospital, Boston, will give a general paper on the chemistry of immunity, and it is anticipated that papers dealing with the rôle of fats and of carbohydrates in immunity and serological investigations will be presented. Caryl P. Haskins, of the General Electric Research Laboratory in Schenectady, has promised a paper on "Problems in the Biological Fixation of Atmospheric Nitrogen at Ordinary Temperatures and Pressures." On Wednesday afternoon Professor J. W. McBain, of Stanford University, together with T. F. Ford and D. A. Wilson, will present a paper on "New Methods of Studying the Surfaces of Ordinary Solutions." During the same session Professor Wilder D. Bancroft, of Cornell University, with W. E. Heming and John E. Rutzler, Jr., will describe "The Mechanism of Anesthesia in Insects." If time permits, one or two other papers on physical-chemical topics will follow. These will probably be "A Phase Rule Study of the Calcium Arsenates," by G. W. Pearce and L. B. Norton, of the New York State Agricultural Experiment Station, and "The Relation of Spatial Structure and Chemical Behavior of Solid Iron Oxides and Iron Oxide Hydrates," by Oskar Baudisch, of the Institute of Balneology, Saratoga Springs, N. Y. The titles of two papers on vitamin research have been received from members of the New York State Agricultural Experiment Station and will be given on Thursday morning. They are: "The Effect of Various Extraction Procedures upon the Determination of Ascorbic

Acid by Chemical Methods," by G. L. Mack, D. K. Tressler and R. B. Dearborn, and "The Decomposition of Ascorbic Acid by Metallic Catalysts," by G. L. Mack and Z. I. Kertesz. Other papers on organic chemistry, probably dealing with research on dyes closely related to the cyanine dyes which have proved so valuable as photographic sensitizers, are expected. The section meeting is being arranged by the Rochester Section of the American Chemical Society as an inter-sectional meeting in cooperation with the Eastern and Western New York and Cornell Sections of the Chemical Society.

The Section on Astronomy (D) will hold a session for papers on Thursday morning. "The Spectroheli-scope of the Van Vleck Observatory" will be the subject of a paper by Dr. Frederick Slocum, director of the Van Vleck Observatory at Wesleyan University. Dr. Robley C. Williams, of the University of Michigan Observatory, will speak on "Aluminizing the 37½-inch Reflector of the University of Michigan." Other interesting speakers are expected to contribute to this program.

The Section on Geology and Geography (E) will feature a recognition of the one hundredth anniversary of the New York State Geological Survey; therefore most of the program will deal with problems of New York State and related geology. On Tuesday morning at a joint session with the Section on Physics papers will be read by R. D. Evans, of the Massachusetts Institute of Technology, and others, dealing with radio-activity and the age of the earth. On Tuesday afternoon there will be an option of two field trips, one devoted to stratigraphy, the other to glacial geology. On Wednesday morning a symposium on New York and Pennsylvania stratigraphy will include papers by Bradford Willard, Frank M. Swartz, Marshall Kay, Louis W. Ploger, John T. Sanford and Tracy Gillette. George B. Cressey will be toastmaster at a special luncheon on Wednesday noon, when Rudolf Ruedemann and Chris Hartnagel will tell about the past and present activities of the State Survey. Following the luncheon there will again be the option of stratigraphic and glacial field trips. The Thursday morning program will be devoted to papers on structure, oil and gas occurrence, pre-Cambrian problems and glacial geology in New York State. Speakers will include Wilmot Bradley, G. B. Richardson, George B. Cressey, Nelson C. Dale, Earl T. Apfel, Alfred C. Hawkins and George H. Chadwick.

The American Society of Plant Physiologists, the Physiological Section of the Botanical Society of America and the American Society for Horticultural Science will cooperate in a joint program. On Wednesday morning a session is to be devoted to a symposium on "The Physiology of Reproduction in Higher

Plants." This will include a discussion of recent developments in photoperiodism, vernalization, nutrient balance and carbon nitrogen ratios. The Wednesday afternoon session is to comprise a series of invitation papers on photosynthesis and enzymatic processes. Hotel accommodations can be had close to the meetings, most of which are in the new campus of the University of Rochester, a short distance from the city. Professor H. C. Thompson, of Cornell University, is chairman of the program committee and will endeavor to assist those planning to attend. Executive committee meetings are planned for Thursday and Friday. Members are requested to submit to the secretary, W. F. Loehwing, Iowa City, Iowa, such matters as they desire to put on the committee agenda.

The Section on Anthropology (H) will meet on Wednesday and Thursday. The Rochester Museum of Arts and Sciences will be host to the section. The program will center about the Indians of the New York area, their prehistory, history and present-day status. Dr. Arthur G. Parker, director of the museum, will discuss culture-patterns of the New York Tribes. William N. Fenton, of the U. S. Indian Service, Tonawanda Reservation, will discuss their social organization. William A. Ritchie, of the Rochester Museum, and Dr. Donald Cadzow, of the Pennsylvania Historical Commission, will present papers on the archeology of New York State and adjacent areas. It is planned also to have a general discussion of physical types, based not only upon the remarkable skeletal material collected by Dr. Parker and Mr. Ritchie, but upon living groups as well. If the number and interest warrants, the members of the section will be given the opportunity to visit a neighboring reservation of the Six Nations.

The Section on Social and Economic Sciences (K) will be represented by two separate group meetings, one in economics and one in sociology. The economics meeting will take the form of a symposium on "Social Security" and will be held on Wednesday afternoon. Among the speakers will be Dr. Carl Snyder, for many years statistician of the Federal Reserve Bank of New York City; Craig Cochrane, of the Eastman Kodak Company, and a representative of the Bureau of Research and Statistics of the Social Security Board at Washington. On Tuesday morning the sociologists will conduct a round-table discussion on the subject, "The Rôle of Mental Hygiene in Student Guidance," to be led by Dr. Eric Kent Clarke, associate professor of medicine and director of the division of psychiatry at the University of Rochester. An article by Dr. Andrew Akelaitis on "Student Guidance at the University of Rochester," giving case illustrations, will be mimeographed and made available in advance to provide a common background. Any one planning to at-

tend this discussion may secure a copy by writing to Dr. Paul Pigors, 42 Prince Street, Rochester, N. Y. On Tuesday at 12:15 there will be a luncheon meeting at the Rochester Chamber of Commerce. The speaker is Harper Sibley, president of the U. S. Chamber of Commerce.

The Section on Engineering (M) will hold sessions on Wednesday and Thursday mornings. On Wednesday morning Professor Earl Church, of Syracuse University, will speak on "Aerial Photogrammetry—a New Science." The application of aerial photography has grown rapidly in recent years, and the difficulties involved have increased so that better and better technique has been demanded. Professor Church is an authority on this subject who has done considerable pioneering, and his paper should be of wide interest. "Administrative Engineering at Cornell University" will be the subject of a paper by Professor J. R. Bangs, Jr., of Sibley College of Engineering at Cornell University. He will show why the administrative engineering curriculum was adopted and how the various economic and socialized courses were used to make it up, a subject of great interest at this time when so much attention is being devoted to revising engineering curricula. On Thursday morning Carl L. Shapiro, assistant metallurgist of the Halecomb Steel Company, Syracuse, N. Y., will discuss "Factors Influencing the Alpha-Gamma Iron Transformation in Carbon Tool Steels," a subject on which he has conducted extensive research. A paper on "Grain Size and Its Influence on the Manufacture of Steel Wire" will be read by B. L. McCarthy, metallurgist of the Wickwire Spencer Steel Company, Buffalo, N. Y. The knowledge of this subject has been added to extensively in recent years so that it has become one of the most interesting developments, and it is expected that the speaker will present much new and interesting information resulting from his work in this field. "The Microcharacter as a Research Tool" will be the subject of a paper by W. E. Conley, W. J. Conley, Harold J. King and Laurence Unger, of the University of Rochester, who have been engaged in investigations on the hardness of metals and alloys during the past four years. The microcharacter is a comparatively unknown research tool which has possibilities that are hardly appreciated at this time. An attempt will be made to show how useful it can be in solving many problems in the application of alloys and in the study of fundamental structure of such materials. The work has been done in close cooperation with Mr. Bierbaum, vice-president of the Lumen Bearing Company of Buffalo, who developed the instrument.

The Institute of the Aeronautical Sciences will devote its sessions on Wednesday morning to photogrammetry. The interest in this development of a combina-

tion of surveying and aerial photography has grown in this country during the past few years, and in 1934 the American Society of Photogrammetry was organized. Both the institute and the society are acting as sponsors of this meeting. Papers covering new developments as well as the major problems of the science will be presented at the meeting. The necessity of mapping large areas more quickly and with greater economy has brought about the employment of aerial photography in connection with surveying. Special equipment of cameras and plotting machines has been developed for this highly specialized work both in this country and abroad. Lieutenant O. S. Reading, of the U. S. Coast and Geodetic Survey, who is to be one of the speakers at the meeting, is responsible for the development of the latest type of multi-lens camera. This camera has nine lenses, which record on one piece of film twenty-four inches square areas as large as five hundred square miles from an altitude of twenty thousand feet. The United States Government is using aerial photography in practically all its major mapping problems. The Soil Conservation Service is mapping vast areas in connection with its problems. Marshall S. Wright, in charge of this service, will describe the methods used in making planimetric and contour maps. The research work done by the Army Air Corps at Wright Field in the use of aerial photographs for producing certain maps by an aerop projector will be discussed by Captain Louis J. Rumaggi, of the Corps of Engineers, U. S. Army. Other important problems, such as films, lens requirements and apparatus especially adapted to photogrammetry as well as the final use of maps made by aerial photography, will be discussed by other speakers. Leon T. Eliel, of the Fairchild Aerial Surveys, Inc., will preside. In the afternoon a visit will be made by members attending the meeting to the laboratories of the Eastman Kodak Company at Kodak Park.

The Section on Medical Sciences (N) will hold sessions on Wednesday and Thursday. The Subsection on Dentistry will also have sessions on Wednesday, and the Subsection on Pharmacy will hold one session on Thursday morning. The outstanding feature of the program of the section will be the memorial session on Thursday morning in honor of Theobald Smith. This will be a joint session with the Central New York Branch of the Society of American Bacteriologists. It will be opened by an address by Dr. Simon Henry Gage, of Cornell University, commemorating the work and life of Theobald Smith, the title of which will be "Theobald Smith; Investigator and Man." It may be recalled that Theobald Smith published his first scientific publication with Dr. Gage. Dr. Edwin G. Conklin, president of the association, will preside at the memorial session.

The Theobald Smith memorial address will be followed by a series of scientific papers dealing with bacteriological subjects. Dr. R. J. Anderson, of Yale University, will present a paper on his chemical studies on the wax fractions of the tubercle bacillus. Dr. Augustus B. Wadsworth, of the Department of Public Health, Albany, will discuss some of the practical problems in the serum therapy of bacterial infection, and Dr. Thomas Ordway, of the Albany Medical College, will present some of his observations on pneumonia. Dr. George P. Berry and Dr. Helen M. Dedrick, of the University of Rochester, will give a paper on the transformation of the virus of rabbit fibroma (Shope) into that of infectious myxomatosis (Santarelli). The question of the coexistent infections of individual cells by more than one filterable virus will be discussed by Dr. Jerome T. Syverton and Dr. George P. Berry, of the University of Rochester. The session will be brought to a close by a discussion of gonococcal infection from the standpoint of diagnosis by the cultural method and of fever therapy, by Dr. Charles M. Carpenter, of the University of Rochester. This will be illustrated with motion pictures.

The section will hold a joint meeting on Wednesday with the Western New York Branch of the Society of Experimental Biology and Medicine. The program will consist of a variety of topics. A paper entitled "Some Aspects of Muscle Creatine" will be read by Dr. Victor C. Myers, of Western Reserve University. Dr. I. Newton Kugelmass, of New York City, will discuss the question of "Modifying Milk for Infants' Digestion." Papers on the "Clinical Significance of the Plasma Proteins in Tuberculosis" and a paper on "Alcohol and Its Influence upon Phenomenon of Impulse Transmission in the Peripheral and Sympathetic Nervous System" will also be presented.

The Subsection on Dentistry reports that the Rochester Section of the International Association for Dental Research, in conjunction with the Rochester Dental Study Club, is planning a one-day meeting on Wednesday. The morning program will consist of a symposium on "Dental Caries." Ten papers will be presented which report research on tooth decay as influenced by diet, saliva, bacteria, heredity, and in relation to chemical and physical properties, histopathological and pathological changes. The afternoon session will open with a paper on "Bacteriophage in Relation to Oral Infection." Other papers will be given, including one illustrated by moving pictures. Scientific demonstrations and exhibits will be given by members of both dental groups sponsoring the meeting.

The Subsection on Pharmacy will hold a session on Thursday morning, and a very interesting program has been arranged. Dr. Marvin Thompson, of the

University of Maryland, will present a paper on "A Comparison of the Pharmacological Syndromes of Ergostetrine (Ergotoxine, Ergobasine, Ergotocin, Ergonovine) and the Ergotoxine-Ergot Alkaloids." Another paper related to this subject will be given by Dr. E. I. Evans, of the University of Chicago, who will discuss "The Minimal Emetic Dose for Fluid-extract of Ergot, Ergotoxin, and Ergonovine." "A Further Study of the Effect of Cyanide on Rat Sarcoma" will be presented by Dr. John C. Krantz and associates at the University of Maryland. "Variations in the Toxicity of Strychnine" will be discussed by Dr. James C. Munch, of Temple University. The program will also include papers by Dr. H. B. Haag, Medical College of Virginia; Dr. Heber W. Youngken, Massachusetts College of Pharmacy; Dr. H. V. Arny and Dr. W. C. Mende, Columbia University College of Pharmacy; Dr. F. K. Riggs and Dr. A. Beaty, Rutgers University; Dr. L. S. Tice and Dr. W. G. Batt, Philadelphia College of Pharmacy and Science; and Dr. William Reindollar, Bureau of Chemistry, Maryland State Department of Health.

The Central New York State Branch of the Society of American Bacteriologists will hold sessions on Wednesday and Thursday. The Wednesday morning session will be a joint symposium with the Rochester Section of the American Chemical Society, on the subject "Immuno-chemistry." One of the outstanding speakers will be Dr. Sanford B. Hooker, of Evans Memorial Hospital, Boston. Arrangements are being made to have several other speakers who will present papers on closely allied topics. Sessions for the reading of papers on bacteriology will be held on Wednesday afternoon and Thursday morning. At the Wednesday afternoon session Dr. Robert S. Breed, of the Agricultural Experiment Station at Geneva, N. Y., will speak on the systematic relationships of the red chromogenic bacteria, and Dr. David H. Bergey of Philadelphia will discuss the genus *Staphylococcus*. A paper on the oxygen supply of aerobic cultures in liquid media will be read by Professor Otto Rahn, of Cornell University, and one on a water-soluble form of alpha naphthal and its inhibitive action upon the intestinal flora of the human subject by Herbert C. Carel, of Redondo Beach, California. Grace Kimball, of Cornell University, will discuss the influence of magnetism upon the growth of yeast, and Leslie A. Sandholzer, of the University of Rochester, will speak on some properties of bacteriophage purified by adsorption and elution methods. On Wednesday evening there will be a dinner for the bacteriologists. On Thursday morning the bacteriologists will participate in the Theobald Smith memorial program arranged jointly with the Section on Medical Sciences. Scien-

tific demonstrations and exhibits will be presented in the Medical School Building of the University of Rochester.

The Association of Official Seed Analysts of North America will convene on Tuesday morning. A comprehensive program has been arranged with three invited speakers. Excursions to trial grounds and seed establishments in the vicinity of Rochester have been planned to follow the formal program of papers for

each day. On Friday morning the entire association will move to the State Experiment Station at Geneva to visit that institution and more particularly the seed testing laboratory and seed control fields there. This day's program will also include round-table and group conferences in the laboratories. Special emphasis and attention is being given to the reports of the various committees, especially those dealing with the revision of rules, legislation and the handbook of seed testing.

OBITUARY

ROGER G. PERKINS

THE faculty of the School of Medicine of Western Reserve University has adopted a resolution signed by Drs. Frederick C. Waite, T. Wingate Todd and James A. Doull in memory of the late Roger G. Perkins:

The faculty of the School of Medicine of Western Reserve University records its deep regret at the death of Roger Griswold Perkins, a member of its teaching staff since 1899, and, at the time of his death at Providence, Rhode Island, on March 28, 1936, professor emeritus of hygiene and preventive medicine in this school.

Dr. Perkins brought to his work here a spirit of scholarship and devotion to service, with a catholicity of interests that marks a man of culture. The spirit of scholarship stamped his teaching and the spirit of service imbued his strivings for public welfare.

With willing unselfishness, he carried his share of the burdens of committee work and from June, 1927, to March, 1929, he served as secretary to the faculty.

For the chair of hygiene and preventive medicine established in 1910, Dr. Perkins was the logical choice and this was followed by the creation, for him, of a separate department of hygiene and bacteriology in 1914.

His keen sense of public welfare carried the activities and contributions of his department beyond the walls of the school and beyond its student body to the entire community, and particularly to the public health problems of the City of Cleveland. He succeeded in impressing upon both official and voluntary agencies the scientific and detached point of view of a research worker in public health.

Charming manners, personal dignity, unvarying cheerfulness and tolerance of the opinions of others, marked all his professional relationships and attached him to his colleagues both as a co-worker and as a personal friend.

The members of this faculty, regarding his death as a personal loss, cherish the memory of his services through more than three decades to this school and university.

RECENT DEATHS AND MEMORIALS

DR. HARRY M. KELLY, since 1894 professor of biology at Cornell College, Mount Vernon, Iowa, died on April 10 at the age of sixty-nine years.

DR. ALBERT H. LOW, chemist, of Denver, member of the firm of Von Schulz and Low, died on April 9 at the age of eighty years.

DR. F. C. SAUER, assistant professor of zoology at the University of Wichita, Kansas, died on April 16. He was thirty-three years old.

DR. AUSTIN CAREY, of Lake City, Fla., logging engineer of the National Forest Service, died on April 28 at the age of fifty-six years.

DR. ALBERT CARLESS died on April 29 at the age of seventy-three years. He was emeritus professor of surgery at King's College, London, and a fellow of the American College of Surgeons.

Nature records the death of Professor James Rice, associate professor of physics in the University of Liverpool and author of books on the theory of relativity, on April 17, aged sixty-two years.

THE death is announced by cable from Zurich of Professor Georg Wiegner, agricultural chemist.

A PORTRAIT of the late Dr. Edgar Fahs Smith, professor of chemistry and provost of the University of Pennsylvania, was formally presented to the new Edgar Fahs Smith Junior High School in York, Pa., on April 29. The portrait, painted by Mrs. Elsa Koenig Nitzsche, depicts Dr. Smith conducting chemical experiments in his laboratory at the university.

AN Associated Press dispatch from Hamburg to *The New York Times* reports that the names of one hundred and sixty-five roentgenologists who have sacrificed their lives to medical research have been chiseled on a simple sandstone memorial in front of the Roentgen Institute of St. George's Hospital. The honor list includes 46 French, 40 American and 17 German radiologists. Other countries represented are Great Britain, Italy, Hungary, Switzerland, Austria, Denmark, Czechoslovakia, Spain, Belgium, Finland, Russia and Holland.

SCIENTIFIC EVENTS

THE BLACKPOOL MEETING OF THE BRITISH ASSOCIATION FOR THE ADVANCEMENT OF SCIENCE

THE British Association for the Advancement of Science will hold its one hundred and fifth annual meeting at Blackpool from September 9 to 16. The inaugural general meeting will take place in the Empress Hall at the Winter Gardens, at 8:30 P. M., on Wednesday evening, September 9, when Sir Josiah Stamp will deliver the presidential address, dealing with the impact of science on society.

It is stated in the preliminary program that the main object of the meeting will be "to obtain more general attention for the objects of science and the removal of any disadvantages of a public kind which impede its progress." Having in view these aims, which are among those prescribed for the association in the first statute adopted on its foundation, the council, in cooperation with the sections, have considered the growing strength of the public demand for a more systematic presentation of selected subjects of scientific investigation in their bearing on the life of the community. It is pointed out that every item in the program potentially possesses such a bearing; the results of any scientific research may, immediately or ultimately, affect the public welfare. It is intended, however, to group together in a definite series each year certain communications in which the more immediate public interest will be stressed.

The presidents of the sections and the titles of their addresses are as follows:

Section A (Mathematical and Physical Sciences): Professor Allan Ferguson, "Trends in Modern Physics."

Section B (Chemistry): Professor J. C. Philip, "The Training of the Chemist for the Service of the Community."

Section C (Geology): Professor H. L. Hawkins, "Paleontology and Humanity."

Section D (Zoology): Dr. Julian Huxley, "Natural Selection and Evolutionary Progress."

Section E (Geography): Brigadier H. S. L. Winterbotham, "Mapping of the Colonial Empire."

Section F (Economic Science and Statistics): Dr. C. R. Fay, "Some Aspects of Commercial Agriculture."

Section G (Engineering): Professor W. Cramp, "The Engineer and the Nation."

Section H (Anthropology): Miss D. A. E. Garrod, "The Upper Paleolithic in the Light of Recent Discovery."

Section I (Physiology): Professor R. J. S. McDowall, "Integration of the Circulation."

Section J (Psychology): A. W. Wolters, "Patterns of Experience."

Section K (Botany): J. Ramsbottom, "The Uses of Fungi."

Section L (Education): Sir Richard Livingstone, "The Future in Education."

Section M (Agriculture): Professor J. Hendrick, "Soil Science in the Twentieth Century."

The first evening discourse will be delivered on September 11 by Clifford C. Paterson. He will speak on science and electric lighting. The second, by Captain F. Kingdon Ward, will deal with plant-hunting and exploration in Tibet. Public lectures will be given in neighboring towns, including Lytham St. Annes, Poulton-le-Fylde, Preston, Southport, Fleetwood, etc. Lectures to young people will be arranged in Blackpool, including one by Brigadier H. S. L. Winterbotham, on the Crown Colonies in Africa.

The societies in correspondence with the association consist of (a) affiliated societies undertaking local scientific investigations and publishing the results, and (b) associated societies of at least three years' standing, and not fewer than 50 members, formed for the purpose of encouraging the study of science. Delegates of the corresponding societies will meet on September 10 and 15, to discuss matters of common interest to the societies and the association. The subject of the presidential address, by Dr. A. B. Rendle, will be "The Preservation of Native Floras."

There will be the usual excursions to educational and industrial institutions and to places of scenic and historic interest in the vicinity of Blackpool, including visits to the Lancashire County Council Agricultural College, Stonyhurst College and Rossall School, which will be open for inspection. An excursion of four days' duration in the Furness District is being arranged in collaboration with the Yorkshire Geological Society immediately preceding the meeting. The numbers attending this excursion will be strictly limited, and application should be made in the first instance to the recorder of Section C, Dr. A. K. Wells, King's College, Strand, London, W.C. 2.

A pamphlet has been issued by the association entitled "Five Years Retrospect, 1931-1935." It is intended that this summary report should be the first of a series dating from the beginning of the association's second century, in 1931, its principal purpose being not to review the transactions of the annual meetings, but to illustrate by examples the perennial activities of the association which arise from or are supplementary to those transactions. It is pointed out that there has never previously been a continuous succession of five years in each of which the numbers at the annual meetings have exceeded 2,000, and the attendances between 1931 and 1935 are regarded as evidence of a widening of the appeal of the association. Future annual meetings will be held in Nottingham in 1937 and in Cambridge in 1938.

WILDLIFE RESOURCES

WITH the signing of an agreement by state agencies in Ohio, nine states are now cooperating with the U. S. Bureau of Biological Survey in investigations to learn how to increase, maintain and use wildlife resources, and to show on trial areas how facts found in research can be applied in a practical manner. In addition to Ohio the cooperating states are: Alabama, Connecticut, Iowa, Maine, Oregon, Texas, Utah and Virginia.

Several other states sought to take part in the research program, but available funds limited the quota to nine. These were selected with a view to carrying on research on a regional basis with as little duplication as practicable. Each state program is arranged so that the practical information obtained may be applied in a large area.

Advisory committees of representatives of the Biological Survey, land grant colleges and state game departments administer the work and funds. Project leaders selected by the bureau and states direct the active work at the land grant colleges.

Major studies under way thus far at the college stations and project leaders are: mourning dove, Alabama Polytechnic Institute, Auburn, Ala., H. S. Peters; eastern cottontail rabbit, Connecticut Agricultural College, Storrs, Conn., Dr. Paul D. Dalke; muskrat, midwestern cottontail rabbit, and coot, Iowa State College, Ames, Ia., Logan J. Bennett; woodcock and moose, University of Maine, Orono, Me., C. M. Aldous; raccoon, gray squirrel and fox squirrel, Ohio State University, Columbus, Ohio; project leader not yet appointed; antelope and possibly blue grouse, Oregon Agricultural College, Corvallis, Ore., Arthur S. Einarsen; western bobwhite quail and western turkey, Texas A. & M. College, College Station, Texas, Dr. W. P. Taylor; mule deer and sage grouse, Utah State Agricultural College, Logan, Utah, Dr. D. I. Rasmussen; and wild turkey, Virginia Polytechnic Institute, Blacksburg, Va., C. O. Handley.

"Each year the money paid to trappers, and that spent by sportsmen and others directly interested in wildlife runs well over a half billion dollars," says Dr. W. B. Bell, chief of the division of wildlife research of the bureau. "Yet very little has been done," he says, "to systematize this industry through careful management. It is the ultimate aim in this research program to find out not only what can be done to produce more wildlife, but how it can be done on a practical land use basis."

One or more trial demonstration areas are being set up at each station in order to work out a complete life history and management practice for one or more particular fur, game or other wildlife species. Most of these areas will be established on land of private owners cooperating with the research projects and in

state and national forests. Summaries of the state programs may be obtained by writing the bureau for leaflet, BS-38.

Funds to maintain the research stations come from the Biological Survey, the American Wildlife Institute and the colleges and game departments of states in which the stations are located.

NATURAL SCIENCE MUSEUMS AT DALLAS

The Museum News reports that three natural science institutions, costing more than half a million dollars, are being constructed on the grounds of the Texas Centennial Exposition in Dallas, which will be open from June 6 to November 29. They are the Museum of Natural History, the Museum of Horticulture and the Aquarium, all financed by the City of Dallas, as a contribution to the exposition and as permanent educational institutions.

The Museum of Natural History is 96 by 140 feet in ground dimensions and two stories high. It is of structural steel framework, faced with native Texas limestone. Texas marble is used for carved cornice and trim. On the first floor will be displayed habitat groups covering the full range of Texas animal, bird and reptile life, prepared by J. H. Wood, of Ann Arbor; W. A. Mayer, of Dallas, and Jonas Brothers, of Denver. Cases fourteen inches from the floor with view openings uniformly six feet in height are used. The cases range from nine feet deep and thirty feet wide downward. The backgrounds are by J. D. Figgins, formerly of the Colorado Museum of Natural History. On the second floor will be displayed mineral and geological material, mostly of Texas origin, gathered under the supervision of H. W. Law; also a display of photographic transparencies of Texas wildflowers in natural colors. In the basement is air-conditioning machinery for the operation of a system of temperature and humidity control, and space for workshops. The museum is under the direction of F. W. Miller, curator, with J. D. Figgins as assistant.

The aquarium is a concrete structure faced with cream-colored brick and is 150 by 70 feet. The building and equipment cost about \$182,000. Skylights admit the maximum of sunlight through glass of a special type which passes a major portion of the ultraviolet rays. Water circulation is by electric pumps to gravity-feed tanks. The display facilities include eight tanks of 2,000 gallons capacity, four of 3,000 gallons, eighteen major and twenty-four balanced display tanks—all for fresh-water species; also four small tanks for salt water species, chiefly from the Gulf of Mexico off the Texas coast. The collection of tropical fishes comprises about 75 species. Pierre A. Fontaine, of Dallas, is aquarist in charge.

The Museum of Horticulture is of steel and cream

brick, metal sashed, with ultra-violet glass. It is 174 by 170 feet in ground dimensions and cost \$125,000. It is equipped with the newest devices for regulation of temperature and humidity. By careful culture and adjustment of temperature a representative group of the best known Texas wildflowers will be kept in blossom in the building throughout the exposition period. The bluebonnet, official state flower of Texas, which ordinarily ceases blooming early in summer, will be kept in bloom until much later in the season. The features of the display in this building are the wildflower beds and the collection of desert plants, including many species of cacti, yucca, agaves and the thorny shrubs of the Big Bend country.

These three buildings, with the half-million dollar art museum also to be built by the city on the exposition grounds, will form a permanent civic center.

GIFT TO THE JOHN SIMON GUGGENHEIM MEMORIAL FOUNDATION

ANNOUNCEMENT of a gift of securities having a present market value of more than one million dollars, by former United States Senator and Mrs. Simon Guggenheim to enable the John Simon Guggenheim Memorial Foundation "to realize in larger measure the object of its creation," was made on May 11. With this third donation by Senator and Mrs. Guggenheim the capital fund of the foundation, wholly given by them, now stands at more than \$6,000,000. The foundation is a memorial to a son of the founders, John Simon Guggenheim, who died on April 26, 1922. The foundation's income is devoted to providing opportunities for men and women of high ability to further their work, and the assistance is available, within the limits of the foundation's income, to scholars working in any field of knowledge and to artists working in any branch of the arts, including poets, novelists, essayists, sculptors, painters, etchers, composers of music and others.

In making this donation Senator and Mrs. Guggenheim conveyed to the Board of Trustees of the Foundation their "deep satisfaction with the truly notable results" which have been realized by the foundation in the eleven years since its establishment. Their first donation to the foundation was made in 1925 and four years later, in 1929, they increased the endowment to permit the establishment of Latin American Exchange Fellowships. Senator Guggenheim's letter to the trustees, written upon the occasion of making this new endowment, reads:

In following the course of the foundation during the intervening years, we have observed with deep satisfaction the truly notable results which even in so short a

period have been realized by a faithful adherence to the basic purpose announced in the charter, of promoting "the advancement and diffusion of knowledge and understanding and the appreciation of beauty, by aiding without distinction on account of race, color or creed, scholars, scientists and artists of either sex in the prosecution of their labors." We have watched with growing interest the undertakings of the fellows of the foundation in their chosen fields, and have rejoiced in their successes and achievements. Those achievements, and the manner in which they have been acclaimed, would seem already to have proved the essential worth and soundness of the plan adopted. Two things, however, have convinced us of the intrinsic value of the foundation and of its worthiness to endure; first, the number and quality of those who apply to it for aid, and the variety and importance of the projects to which they devote their talents; and, second, the endorsement of the aims of the foundation evidenced by the willingness with which men and women of the highest distinction among the representatives of learning, art and letters have served on its Advisory Board and on its Committees of Selection, freely giving of their time and thought whatever was required.

These considerations have moved us to make a third donation to the John Simon Guggenheim Memorial Foundation in furtherance of its purpose. This we now do in the hope that the foundation will thereby be enabled in the future to accomplish greater good to greater numbers, and so realize in larger measure the object of its creation.

In its first eleven years the foundation has made 688 grants, carrying appropriations of more than \$1,400,000. Of these 688 grants, 48 were made to citizens of Argentina, Chile, Cuba, Mexico and to Puerto Ricans, on the Latin American Fellowship program of the foundation. The remaining 640 grants include 115 renewals of fellowships and were made to 525 persons. The Committees of Selection of the Foundation have considered 9,584 applications. Of the fellows appointed from the United States, the youngest at the date of his appointment was 22 years old, the oldest 65. The average age was 34.9 years. Classified according to place of birth, and considering only fellows born in the United States, it is shown that 213 were born in rural areas—that is, on farms or in villages of less than 5,000 population—and that 215 were born in centers of more than 5,000 population. The foundation has granted fellowships to more than twice as many persons to assist research as to assist creative work in the arts. Three hundred and sixty scholars have received research fellowships while the number granted to workers in various fields of the fine arts is 165. More fellowships have been granted to assist research in the biological sciences, including medicine, than in any other field.

SCIENTIFIC NOTES AND NEWS

A BRONZE bust of Simon Newcomb, by Frederick MacMonnies, the gift of Dr. Ambrose Swasey, of Cleveland, will be unveiled by Dr. Anita Newcomb McGee, his daughter, in the Hall of Fame of New York University on May 28. Dr. Harlow Shapley, director of the Harvard College Observatory, will make the presentation. A tribute to Newcomb will be made by Dr. W. W. Campbell, director emeritus of Lick Observatory and president emeritus of the University of California.

PROFESSOR CHARLES ATWOOD KOFOID, for many years chairman of the department of zoology at the University of California, will retire at the end of the present academic year. On his seventieth birthday, October 11, 1935, at a meeting of his colleagues and students, he was presented with a specially dedicated volume of the University of California Publications in Zoology, of which he has long been an editor. At a special program held in his honor during the eighth annual winter meeting of the Western Society of Naturalists, six of his former students read papers. Fifty-five students have received the degree of doctor of philosophy for work under his direction. As many of these as could do so met at an informal dinner on May 2 to present him with a bound volume of manuscripts and letters of appreciation.

DR. SIEGMUND FREUD, of Vienna, founder of psychoanalysis, celebrated his eightieth birthday on May 6.

THE Pan American Medical Association has conferred honorary associate membership on Dr. William David Coolidge, director of the research laboratories of the General Electric Company.

DR. E. D. MERRILL, administrator of the botanical collections of Harvard University, has been elected an honorary member of the Botanical Society of Japan.

IN recognition of his publications and his work in assembling materials and records relating to Pacific land snails, Dr. C. Montague Cooke, Jr., malacologist on the staff of Bernice P. Bishop Museum, has been elected corresponding member of the Natural History Museum, Vienna.

THE REV. JULIUS ARTHUR NIEUWLAND, professor of chemistry at the University of Notre Dame, has been awarded the Mendel Medal, annually presented by Villanova College.

DR. JOHN M. WHEELER, director of the Institute of Ophthalmology at Columbia-Presbyterian Medical Center, New York, received on May 9 for outstanding achievement in the prevention of blindness the Leslie Dana Medal of the St. Louis Society for the Blind.

DR. WALTER H. MACINTIRE, of Knoxville, consulting chemist for the Tennessee Valley Authority, has been awarded the Charles H. Herty gold medal for 1936 "for excellent service rendered within the field of chemistry in the southeast." The award is made by the Georgia State College for Women and the Georgia Section of the American Chemical Society. Dr. MacIntire will make an address on "The Romance of the Phosphates."

THE Howard Taylor Ricketts Prize of the University of Chicago for 1936 has been awarded to Dr. John P. Fox for research in pathology and to Dr. Dan H. Campbell for research in bacteriology.

THE W. R. DYKES Medal of the American Iris Society for 1935 has been awarded to E. O. Essig, of the University of California, for the creation of the new blue iris called Sierra Blue.

ON the occasion of the opening of the new University Students Union building, the University of Sheffield conferred on May 2 the honorary doctorate of science on Sir Frank Edward Smith, secretary of the Department of Scientific and Industrial Research, and on Sir Harold Carpenter, professor of metallurgy in the Royal School of Mines, London.

THE seventh annual meeting of the American Association of Physical Anthropologists was held at the Institute of Human Relations, Yale University, on April 30 and May 1 and 2. The sessions were well attended and thirty-two papers were presented. Professor E. A. Hooton gave a public address on "What is an American?" At the annual dinner the toastmaster was President James Rowland Angell, of Yale University, who introduced Professor G. G. MacCurdy, the speaker of the evening. Professor MacCurdy delivered an illustrated lecture on "Man in Palestine." At the final business meeting, Professor E. A. Hooton was elected president, and Professor Raymond Pearl, the retiring president, was elected a member of the executive committee.

AT the annual meeting of the Boston Society of Natural History, held on May 6, the following officers were elected for 1936-1937: *President*, F. W. Hunnewell; *Vice-presidents*, Nathaniel T. Kidder, Glover M. Allen, William M. Wheeler; *Secretary*, Clinton V. MacCoy; *Treasurer*, Augustus P. Loring, Jr.; *Trustees*, Thomas Barbour, Charles H. Blake, Ralph Hornblower, Carl T. Keller, Alfred C. Redfield and William H. Weston, Jr. At the same meeting the annual Walker Prize in Natural History, offered this year for the best memoir on any subject in the field of geology or mineralogy,

was awarded to Professor H. A. Meyerhoff and Miss E. W. Olmsted, Smith College, for their paper on "The Origins of Appalachian Drainage."

THE Virginia Chapter of Sigma Xi held its annual meeting on the evening of April 30, at which time fifteen were received into membership. Dr. Vannevar Bush, of the Massachusetts Institute of Technology, delivered the annual address on "Machines for Analysis of Complicated Problems in Engineering and Physics." Dr. Carl C. Speidel was awarded the President and Visitors' Research Prize.

THE title of emeritus has been conferred by Columbia University on Dr. Franz Boas, who retires at the close of the academic year. Dr. Boas joined the department as lecturer in 1896, becoming professor of anthropology in 1899.

DR. JOHN W. BOWLER, of Dartmouth College, has been made emeritus professor of hygiene and physical education.

SIR ROBERT MUIR will retire on September 30 from the chair of pathology at the University of Glasgow, which he has held since 1900. The retirement is also announced of Dr. T. K. Monro, who has held the chair of the practice of medicine since 1913.

THE resignation of Dr. Karl T. Compton, president of the Massachusetts Institute of Technology, from the Business Advisory Council was announced on May 7 by Daniel C. Roper, Secretary of Commerce. A resolution was adopted by the council expressing "the hope that the limitations of health that have brought about Dr. Compton's temporary retirement will soon be completely removed."

DR. HAROLD M. WESTERGAARD, professor of theoretical and applied mechanics at the University of Illinois, has been appointed Gordon McKay professor of civil engineering at Harvard University and will assume his new work next September. The professorship that he will hold was established in 1909, when Professor George F. Swain was appointed to the chair. In 1929 he retired and was made professor emeritus. The post has not been filled since that time.

DR. A. BERTRUM LEMON, professor of materia medica at the University of Buffalo since 1921, has been elected dean of the School of Pharmacy to take the place of Dr. Willis G. Gregory, who has served as dean for forty-six years.

DR. STEUART H. BRITT, of the division of psychology, Institute of Educational Research at Teachers College, Columbia University, has been appointed to an assistant professorship of psychology at the George Washington University, Washington, D. C.

DR. R. A. COCKRELL has been appointed assistant professor of forestry in the University of California, to succeed Professor H. D. Malmsten, who resigned recently in order to take charge of range management work in eleven western states with the rural rehabilitation service of the federal government.

DR. OTTO A. REINKING, consulting plant pathologist for the United Fruit Company, with headquarters in Boston and Tela, Honduras, has been named head of the division of botany of the New York State Agricultural Experiment Station, Geneva, N. Y., to succeed Dr. F. C. Stewart, who will retire on July 1 after having been head of the division for thirty-seven years.

DR. A. PACKCHANIAN, of the department of pathology and bacteriology of the New York Post-Graduate Medical School and Hospital, Columbia University, has been appointed protozoologist at the National Institute of Health, United States Public Health Service, Washington, D. C.

DR. J. M. GULLAND, reader in biochemistry at the University of London and senior assistant in biochemistry in the Lister Institute, has been appointed to the Sir Jesse Boot chair of chemistry at University College, Nottingham, in succession to Professor F. S. Kipping, who will retire at the end of the academic year.

PROFESSOR D'ARCY WENTWORTH THOMPSON, professor of natural history at the University of St. Andrews, has been invited to deliver a course of Lowell Lectures at Boston. The Senatus Academicus of the university has granted the necessary leave of absence to enable him to accept this invitation.

DR. WALTER B. CANNON, George Higginson professor of physiology at the Harvard Medical School, was guest speaker at the seventy-eighth meeting on April 29 of the Maryland Biological Society in Baltimore. His subject was "Sensitization of Denervated Structures."

DR. THOMAS BARBOUR, professor of zoology at Harvard University and director of the Museum of Comparative Zoology and the University Museum, lectured recently before the Harvard Club of Louisiana at Tulane University on "My Experiences in the Tropics."

DR. ARTHUR H. COMPTON gave a lecture on "The Quest of the Cosmic Ray" at Lynchburg College, Virginia, on the evening of April 29.

THE eighth Harvey Society Lecture will be given on May 21 at 8:30 at the New York Academy of Medicine by Dr. I deBurgh Daly on "The Physiology of the Bronchial Vascular System."

THE seventh lecture in the Smith-Reed-Russell series at the School of Medicine of the George Washington University was given on April 28 by Dr. Stuart Mudd, of the department of bacteriology of the School of Medicine of the University of Pennsylvania. He spoke on "The Mechanisms of Antigen-Antibody Reactions."

DR. THORVALD MADSEN, director of the State Serum Institute of Denmark, will deliver the fifth series of Abraham Flexner lectures at the Vanderbilt University School of Medicine during the 1936-1937 session.

THE Argentine senate has passed a bill whereby 150,000 pesos (about \$42,000) will be allowed yearly for the upkeep of a national institute of physics applied to human pathology. Dr. Mariano R. Castex has been appointed director.

A NEW research unit, to be known as the Animal Nutrition Division of the Bureau of Animal Industry of the Department of Agriculture, was established on May 1. Dr. Paul E. Howe, who has since 1924 been senior biochemist in charge of nutrition investigations in the Animal Husbandry Division, has been named chief of the new division. The reorganization has been effected in order to increase the emphasis on research dealing with fundamental problems of feeding and nutrition of farm animals. For the most part the new division will use existing personnel and research facilities, plus enlarged laboratory space and equipment made available by the building program of the National Agricultural Research Center at Beltsville, Md. Dr. Howe plans to organize the work of the new division into four principal sections: One devoted to biological studies of nutritional problems with laboratory animals; another, to the biochemistry and physiology of digestion; a third to the nutritive requirements of cattle, sheep, swine, goats, horses and dogs, and general studies of the digestibility of feeds, and the fourth to poultry nutrition.

THE thirteenth Colloid Symposium will be held at the Washington University School of Medicine, St. Louis, from June 11 to 13.

THE first steps toward the organization of the American Society of Plant Taxonomists were taken at St. Louis on January 1. A council was elected, consisting of: LeRoy Abrams, Leland Stanford University; N. C. Fassett, University of Wisconsin (secretary); H. A. Gleason, New York Botanical Garden; P. A. Munz, Pomona College; Aven Nelson, University of Wyoming (chairman); F. W. Pennell, Philadelphia Academy of Sciences; E. E. Sherff, Chicago Teachers College. Copies of the constitution may be had on application to the secretary. All botanists interested in taxonomy of both vascular and non-vascular plants are eligible for membership, and may be enrolled as charter members by sending name, address and dues

(one dollar for two years) to the secretary before July 1.

THE second International Congress on Glass will be held in London and Sheffield, from July 2 to 11, according to an announcement made by W. E. S. Turner, of the University of Sheffield, president of the International Commission for Glass Technology. This commission was formed at the first International Congress on Glass and Ceramics held in Milan, Italy, in September, 1933. Dr. Turner states that the interests of those expected to attend the congress are so many and so varied that it has been found impossible to limit the number of subjects to fewer than twenty. They have been classified into four groups, and it is planned that three of these groups shall meet simultaneously. Group I contains subjects which should be profitable for discussion by the members of the various organizations interested in the publications of literature and in the organization of methods of drawing up specifications and standards. Group II will deal with problems connected with the manufacture and properties of glass. Group III will deal with refractory materials, fuels and furnaces. Group IV will be concerned with the manipulation, form, design and decoration of glass.

THE rôle of research in the various federal government departments and bureaus as carried on during the past two and a half years was the main topic of discussion at the seventeenth annual dinner-meeting of the National Research Council's Division of Engineering and Industrial Research, held on May 4 at the Engineers Club, New York. The meeting was attended by fifty leading executives, engineers and leaders of scientific research. The chief speaker was Dr. Frank B. Jewett, president of the Bell Telephone Laboratories, whose subject was "Activities of the Science Advisory Board." Dr. Jewett reviewed the accomplishments of the board since its creation by President Roosevelt in July, 1933, and forecast the progress that will be made in the future. Reports read at the meeting on projects sponsored by the Division of Engineering and Industrial Research included those by J. W. Barker, chairman of the Committee on Bridging the Gap between University and Industry; W. H. Carrier, chairman of the Heat Transmission Committee; H. E. Dickinson, chairman of the Highway Research Board; J. B. Whitehead, chairman of the Committee on Electrical Insulation, and B. A. Bakhmeteff, vice-chairman of the Committee on Hydraulic Friction. Dr. Vannevar Bush, vice-president of the Massachusetts Institute of Technology, was elected chairman of the division, to succeed Charles F. Kettering. Howard Poillon, president of the Research Corporation, was elected vice-chairman of the division.

DISCUSSION

A SOLAR ERUPTION AND SIMULTANEOUS
DISTURBANCES AT HUANCAYO
MAGNETIC OBSERVATORY

At the magnetic observatory of the Department of Terrestrial Magnetism of the Carnegie Institution of Washington located near Huancayo, Peru, an unusual solar eruption was observed on April 8, 1936, by means of the Hale spectroheliometer. That this activity on the sun produced effects on the earth is indicated by the simultaneous disturbances in terrestrial magnetism and earth-currents recorded there and also by the "fading out" of the radio-signals, which the high atmosphere, the ionosphere, normally reflects back to the transmitter-receiver used for investigations at that place.

The usual second period of observation with the spectroheliometer (in accordance with the program of Commission No. 11 of the International Astronomical Union as arranged at the Paris meeting held in 1935) began at 16^h30^m G.M.T., and to within a minute or two of seeing the phenomenon about to be described, nothing unusual had been noticed. At 16^h45^m, activity was first noticed surrounding the largest sun-spot of a group of about six, located at approximately 23° North and 10° West of the central meridian. This increased in brightness until 16^h47^m, reaching intensity 2, and soon after this it was noticed that three other smaller sun-spots in the group had become active, although this was rather mild in comparison with the first-mentioned activity. Around 16^h50^m the flocculus about the largest sun-spot appeared to slowly decrease in size, but retained its great brilliancy. Before disappearing, the flocculus about the largest sun-spot assumed the shape of a quite perfect Latin cross. By 17^h03^m the flocculi about all the sun-spots had returned to their original appearance.

It should be noted that spectroheliometer observations were made on April 7 in the regular periods of 15^h30^m to 16^h00^m and 16^h30^m to 17^h00^m. Observing conditions were satisfactory, but no activity of any kind was observed.

The magnetic record: The photographic records of the three magnetic elements, horizontal intensity, H , declination, D , and vertical intensity, Z , showed an abrupt departure ("sudden commencement") from the usual trend at approximately 16^h46^m G.M.T. which developed into a swing lasting about 40 minutes in H , 20 minutes in D and 70 minutes in Z . The maximum amplitude of the swing in H and also in D , was reached at 16^h51^m, whereas that in Z was reached at 17^h04^m. These amplitudes amounted to an increase of 108 gammas (1 gamma = 0.00001 C.G.S. unit) in H , a change of 2.1 minutes of arc easterly in D and a

decrease of 11 gammas in Z . The return to normal occurred more gradually than the sudden departure, which, together with the fact that the magnetic perturbations which usually occur in daytime at Huancayo may have an amplitude nearly one half that of this particular departure, make it difficult to ascertain where the part which is possibly associated with the solar eruption ends. It seems certain that it did not continue as long as two hours after its sudden commencement. No such disturbance appeared on either the preceding or following days.

The earth-current record: The four lines of earth-current systems I and III were recording smoothly and normally until 16^h45^m, G.M.T., on April 8. At that minute all four lines showed radical changes in potentials. For three of the lines, the changes in potentials went beyond the edge of the recording-paper, so the magnitude of the change is not known. However, for the east-west line of system III (adjacent to the observatory) the value changed from -35 millivolts to less than -20 millivolts. The north-south line of system III changed from -3 to more than +20 millivolts. For system I (two miles east of the site of the observatory) the north-south line changed from -6 to more than +20 millivolts, while the east-west line changed from +4 to -26 millivolts. The last-mentioned change is completely shown on the recording-paper. By 17^h03^m the values of potential on all four lines had returned to normal and the recording thereafter showed no irregularities. The disturbance was thus confined to exactly the same period as that of the solar eruption.

The ionosphere record: In accordance with established procedure in the program of ionospheric studies, a series of photographically-recorded manual multi-frequency runs was scheduled for April 8, for the determination of F_1 and F_2 critical-frequencies. The series of runs was begun at 10^h30^m, G.M.T., and was continued until 18^h26^m, there being one run in each hour, beginning on the half-hour. No unusual features were observed for any of the runs until that begun at 16^h20^m (this was begun somewhat earlier than scheduled). The previous run occupied the interval between 15^h30^m and 16^h14^m, and the range of frequencies covered was from 3,800 to 9,600 kc, at intervals of 100 or 200 kc. In this run reflections were obtained consistently. In the run which began at 16^h20^m, reflections were consistently obtained through 6,200 kc, the latter value being used at 16^h44^m. With the apparatus adjusted for 6,400 kc, recording was begun at 16^h45^m, but no reflections were obtained from any layer. Changes in frequency were continued from minute to minute through 9,000 kc at 17^h02^m, at which time observations were abandoned, since no reflections were being

obtained at any frequency. During the interval between 16^h45^m and 17^h02^m, as it appeared that the apparatus had become defective, various features of the apparatus were examined as time permitted and the antenna was inspected. Both apparatus and antenna were found to be in good order in every respect. At 17^h04^m, the apparatus was adjusted for 4,800 kc, the frequency used for fixed-frequency recording, but no reflections were obtained. No photographic record was attempted at this frequency. Beginning another run at 17^h40^m at 3,800 kc, nothing unusual was encountered throughout the whole run, which was terminated at 18^h26^m with a frequency of 9,600 kc.

Discussion: From the preceding paragraphs it will be seen that a solar disturbance began at 16^h45^m on April 8, 1936, and was accompanied by disturbances in magnetism, earth-currents and ionosphere-phenomena. According to the photographic records all these are known to have begun on about the same minute. The time-control of all instruments and apparatus at the Huancayo Magnetic Observatory is such that there is no question as to the element of time in connection with any of the records.

It seems generally accepted that solar disturbances are largely related to disturbances in the terrestrial elements just enumerated. Some think the solar disturbances precede terrestrial effects by about twenty-four to twenty-six hours. No solar disturbance was noted here on April 7 which would have preceded by twenty-four to twenty-six hours the magnetic, earth-current and ionospheric disturbances recorded here on April 8.

These observations may therefore indicate that some solar disturbances are capable of causing simultaneous disturbances in magnetism, earth-currents and the ionospheric regions. If the solar disturbance of April 8 were to lead by some twenty-six hours disturbances in the terrestrial elements, then the magnetic trace of April 9 should have been disturbed. The magnetic record of April 9 is entirely undisturbed; so, also, are the records of earth-currents and the ionosphere. Furthermore, the similarity of the time-duration for both solar and terrestrial disturbances is in this case striking. The solar disturbance was of eighteen minutes' duration; so was the major part of the earth-current disturbance. The duration of the ionospheric disturbance is not known but was evidently less than one hour. The duration of the magnetic disturbance, while not clearly defined, is not inconsistent with the interpretation suggested here.

It is of interest to note from Fig. 3 of the Bell System Monograph B-895, by A. M. Skellett, that solar disturbances about 13° west of the central meridian are most favorably located to produce terrestrial disturbances. The solar disturbance reported here was very

near this location, being centered approximately 10° west of the central meridian.

It is, of course, recognized that the material presented here is but an isolated case and does not, therefore, offer the best basis for drawing conclusions as to the relationship between solar and terrestrial phenomena. However, considering the number of elements involved and the high degree of simultaneity found for all the disturbances, the matter seems worthy of note. While there may be radiations, expelled from disturbed solar areas, which produce effects on the terrestrial elements only after an interval of twenty-four to twenty-six hours, there may also be some radiations which travel with the speed of light and which therefore produce disturbances in magnetism and earth-currents, the ionospheric regions and possibly in other geophysical elements at the instant when corresponding solar disturbances are observed.

O. W. TORRESON
W. E. SCOTT
H. E. STANTON

HUANCAYO MAGNETIC OBSERVATORY
HUANCAYO, PERU

THE OVULE AND SEED OF *COFFEA ARABICA* L.

IN studying the vascular anatomy of the flowers of the Rubiaceae the writer came upon certain morphological features of the ovule of *Coffea arabica* L. that have been misinterpreted or overlooked.

In the first place, the ovule has no integument, a structure that is mentioned repeatedly in the literature on coffee. Though *Coffea* and *Houstonia* may not be closely related genera it might be of interest to note that Lloyd,¹ in 1902, reported that an integument is lacking in the latter genus. Froehner² mentions the integument and tells of the obturator (or caruncula), a massive outgrowth from the placenta (funiculus?). This has been observed by the writer, but there is no sign of an integument.

Another fact of far greater importance, especially in studies on the inheritance of endosperm characters, is that the endosperm is evanescent. When the embryo is very young there is apparently a scantily developed endosperm, but this disintegrates as the embryo enlarges; consequently the mature seed has none. What botanists have been calling endosperm is really perisperm, and it is the nucellus that enlarges to form the nutritive tissue around the embryo.

The fate of the polar nuclei has not yet been determined, but an investigation of this is well advanced and will be reported presently. In a subsequent pub-

¹ F. E. Lloyd, *Mem. Torrey Bot. Club*, 8: 1902 (cited by Goebel, "Organographie," Dritte Auflage, p. 2041. Jena, 1933).

² A. Froehner, "Die Gattung *Coffea* und ihre Arten," *Diss. Univ. Rostock*, pp. 10-11. Leipzig, 1898.

lication the morphology of the coffee flower will be treated in detail.

WILLIAM G. HOUK

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ON THE REACTION OF ANTHOCYANINS WITH THE SULFITES

ANTHOCYANINS were extracted from the flowers of *Pelargonium zonale* and of various other plants by means of a hot 5 per cent. solution of citric acid.

The red-colored liquids were carefully treated with powdered sodium sulfite and sodium hydrosulfite ($\text{Na}_2\text{S}_2\text{O}_4$), respectively. On account of the reduction of anthocyanins the extracts became colorless. When afterwards some tincture of iodine was added in an adequate amount the original red color of anthocyanins reappeared unchanged as to its strength and shade.

A red pigment which was obtained by a reduction of flavonols by means of magnesium in the presence of hydrochloric acid did not become decolorized by the sulfites, and it turned orange-yellow if afterwards some iodine was added.

The flavonols, extracted from the yellow flowers of various plants, did not produce any red color after

their treatment with sodium hydrosulfite, and with magnesium in the presence of organic acids, respectively. This latter decolorized the above extracts of anthocyanins in the absence of air more or less irreversibly.

The results of the above reactions corroborate the old hypothesis on the formation of anthocyanins by an oxidation of anthocyanogens, and, on the other hand, they indicate that the hypothesis, put by Willstätter, according to which anthocyanidins are formed in nature by a reduction of flavonols, does not seem to be fully justified.

ANTONI KOZLOWSKI

POZNAN, POLAND

IODINE THERAPY FOR GOITER

APROPOS of Mr. Alexander's article in the March 6 issue of SCIENCE (pp. 230-231) with special reference to Dr. McCay's note on Boussingault, I may perhaps be permitted to point out that a decade ago I called attention, in this journal (SCIENCE, 63: 428, August 23, 1926) to that early investigator's remarks and there gave some references that may be of interest.

GILBERT D. HARRIS

PALEONTOLOGICAL RESEARCH

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SCIENTIFIC BOOKS

RECENT BOOKS ON ASTRONOMY FOR THE GENERAL READER

The Solar System and Its Origin. By HENRY NORRIS RUSSELL. 144 pages, 14×20 cm. The Macmillan Company, New York, 1935. Price, \$2.00.

A DISTINGUISHED astronomer gives an account of the present state of our knowledge of the solar system. Within the modest covers of this book there is a wealth of information for the scientist and the general reader alike, presented in the author's characteristic informal, sparkling style. The first two chapters consider the properties of the system as they are known to-day, including the important conclusions from the researches of the past few years. The third chapter treats of the theories of its origin. Dr. Russell's conclusion that no one can yet say how our system originated in detail, leaves the reader with the thought, not of the necessary futility of such inquiries, but rather of the magnitude of the problem to be solved. And his guarded reference to something that may have happened two thousand million years ago, in which the earth's beginning was only a minor item, suggests that the problem is not being abandoned.

Stars and Telescopes. By JAMES STOKLEY. xiii + 319 pages, 15×22 cm. Harper and Brothers, New York, 1936. Price, \$3.00.

THIS attractive book, by the associate director in charge of the Fels Planetarium, in Philadelphia, is an answer to the frequent queries of visitors to the planetarium for the name of a book on astronomy that is suited to the general reader. It presents in a simple but authoritative way, as Dr. Walter S. Adams remarks in the preface, much of the romantic history of astronomy and the striking developments which have resulted from the application of modern instruments and modern methods. One of the many pleasing features is the well-told story of the telescope itself, from its invention to the present day.

Astronomy. By JOHN CHARLES DUNCAN. Third edition. xvii + 448 pages, 15×22 cm. Harper and Brothers, New York, 1935. Price, \$3.75.

THE appearance of the third edition of this familiar text book for beginning classes in colleges and universities, first published in 1926, bears witness to its continued success. The new edition contains extensive revisions, particularly in the later chapters which deal with sidereal and structural problems. The star maps, on a blue background as before, are more clearly reproduced. The author has accomplished very creditably his expressed aim to keep pace in the new edi-

tion with the rapid progress of astronomy, and to improve the methods of presentation.

Consider the Heavens. By FOREST RAY MOULTON. xi + 332 pages, 15 × 23 cm. Doubleday, Doran and Company, New York, 1935. Price, \$3.50.

THE author of this book for the general reader again demonstrates his ability to tell the story of the heavens in a clear and entertaining style. Into his accounts of the celestial bodies and their ways he introduces much of the romance of astronomy, and his belief that order prevails in the universe. Of the fifteen chapters, the one on the origin of the planets is especially welcome, in view of Dr. Moulton's well-known contributions to the subject. The closing chapter on "All Things Change" provides material for reflection on the significance of the picture of the universe that has been presented.

Handbook of the Heavens. Edited by HUBERT J. BERNHARD, DOROTHY A. BENNETT and HUGH S. RICE. xvi + 131 pages, 15 × 23 cm. Whittlesey House, New York, 1935. Price, \$1.00.

THIS "Simple Introduction to the Study of the Stars" was written by members of the Junior Astronomy Club of the Museum of Natural History, New York. Well illustrated, it contains descriptions of the constellations in their seasons, and of the sun, moon, planets, meteors and stars. Young readers, and older ones as well, will find here many suggestions out of the authors' experience for observing the heavens with or without the telescope. And they are likely to be stimulated by the spirit of eager inquiry which pervades its pages. The foreword is a greeting from Dr. Harlow Shapley.

Highlights of Astronomy. By WALTER BARTKY. viii + 280 pages, 17 × 23 cm. The University of Chicago Press, Chicago, 1935. Price, \$2.50.

WRITTEN expressly for an orientation course in the University of Chicago, the chapters of this book conform closely to the conventional sequence, beginning with the earth and its motions, and ending with the sidereal universe. They open brightly with verses and modernistic sketches doubtless designed to lead the student on to the somewhat more difficult matter ahead. Simple charts are included to aid in locating the stars and planets.

ROBERT H. BAKER

UNIVERSITY OF ILLINOIS

INFANT APE AND HUMAN CHILD

Infant Ape and Human Child (Instincts, Emotions, Play, Habits). By N. KOHTS. Moscow, 1935, pp. xvi + 596, with 145 plates. (Published in Russian, with English summary.)

THE author, wife of Professor Alexander Kohts, founder and director of the Darwinian Museum, Moscow, USSR, presents a long-delayed sequel to her volume on chimpanzee intelligence, which was published in 1923.¹ These two volumes, and a third, which is projected, on the "ability of the chimpanzee to distinguish form, size, quantity, and number, and his capability towards ascertaining likeness and dissimilarity, making analysis and synthesis" (p. 579), are based on naturalistic and experimental studies of an infant chimpanzee between the estimated ages of one and a half and four years, conducted from 1913 to 1916, and in the present volume on comparable studies of the son of the author from birth to four years of age, carried forward from 1925 to 1929.

Mrs. Kohts is a gifted observer, well informed, sympathetic, who with fidelity and exceptional insight describes and compares in these elaborate reports varied expressions of psychobiological characteristics in chimpanzee and man. Fortunately for non-readers of the Russian language, among which the reviewer is numbered, this book includes a comprehensive and extremely interesting summary in English, and in addition 120 pages of photo engravings which present hundreds of carefully selected photographic records. It is chiefly because of these illustrations, which indeed convert the volume into an atlas, that this review is presented to American biologists. The volume is primarily a pictorial and verbal account of emotional expression in chimpanzee and human infancy, and although the illustrations of Mrs. Kohts's earlier volume were superb in quality and of high scientific value, the present collection, in the reviewer's opinion, surpasses them in all respects. They constitute a rich mine of information: fascinating to those who seek entertainment, engrossing to those concerned with psychobiological problems. One need not be deterred from attempt to use this book by language handicap.

The work is constituted by three parts: (1) Behavior of the infant chimpanzee; (2) behavior of the human child; and (3) analysis of behavior of man and ape. Among the topics treated descriptively in these several parts are: physical characteristics and expressions, emotional expressions, instincts (feeding, property, nesting, sex, freedom, social, etc.), play, cunning and deception, use of tools, imitation, memory and language.

The following examples, chosen almost at random, will serve to illustrate the nature and quality of the author's comparisons. Anent destructiveness and effects of prohibitions the author remarks: "Many

¹ "Untersuchungen über die Erkenntnisfähigkeiten des Schimpansen." Moscow, 1923, pp. 453, with 16 plates. (Published in Russian, with a German translation of summary.)

common traits could again be observed in the destructive games of both infants. Such forms of activity as throwing, tearing and breaking seemed indeed to provide both subjects with a peculiar form of self-contained pleasure" (p. 536). "The behaviour of both Roody [boy] and Joni [ape] seems to give ample support to the truth of the saying: prohibited actions were just those to the performance of which both little ones would cling with the greatest steadfastness" (p. 537). "In performing prohibited actions both Roody and Joni would try as best they could to be cunning. They would often try to trick or deceive the observer . . ." (p. 538).

In general, the ape was more readily frightened than the boy, but he overcame his fears more readily and rapidly (p. 550), and whereas the chimpanzee lacked sympathetic feeling for smaller animals, the child was gentle and considerate (p. 551). This contrast appeared despite the fact of like environment for both subjects and efforts on the part of the observer to discourage ill-treatment of animals and to foster sympathetic behavior toward them (footnote, p. 552).

After a multitude of such interesting comparative statements based upon her prolonged study of these two primates, Mrs. Kohts thus sums up her findings: "(1) In the functional biological field: the chimpanzee totally ignores the possibility of walking erect and of freeing his hands for carrying weights. (2) In the sphere of imitation: the chimpanzee is devoid of imitation in so far as human sounds are concerned and generally fails to extend or improve his imitative behavior. (3) In respect of emotional altruistic and

social behavior: the chimpanzee fails to understand the advantages of friendly and sympathetic intercourse with creatures standing on a lower biological level than himself. (4) With regard to habit-forming: the chimpanzee does not improve in the motor habits connected with the use of tools and household implements. (5) In the sphere of playful behavior: he does not indulge in creative constructional play. It seems difficult to predict how far the chimpanzee *might* go by way of acquiring essentially human features, but one thing seems certain, and it is, that the chimpanzee—this strong, sanguine, strongly-willed and highly active animal—actually fails to possess any inherent tendency towards progressing in the above-outlined directions, his failing being especially plainly marked out in such domains where he is definitely handicapped or thwarted by nature" (p. 577).

Concerning these general comparative statements, the reviewer offers the comment that study of many chimpanzees ranging in age from infancy to maturity in Yale Laboratories of Primate Biology indicates the necessity for qualification and supplementation. Neither developmental status nor individuality may be ignored, and if Mrs. Kohts's descriptive statements and comparisons are accepted as generally true for *Pan* and *Homo*, serious injustice will be done to the facts. The opinion also is offered that the genus *Pan* is placed in a disadvantageous light in this volume, because what appears to be an ordinary or typical specimen of immature chimpanzee is compared with an obviously extraordinary example of mankind!

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SOCIETIES AND MEETINGS

THE EASTERN BRANCH OF THE AMERICAN PSYCHOLOGICAL ASSOCIATION

At the annual spring meeting of the New York Branch of the American Psychological Association, held at Fordham University on April 11, it was voted to change the name of the New York Branch, American Psychological Association, to "The Eastern Branch of the American Psychological Association."

In 1929 the New York Branch was reorganized and since then has held annual spring meetings at which the ratio of attendance has been larger than that of the American Psychological Association at its annual meetings. In recent years, the various branch meetings of the American Psychological Association have been highly successful. Many members of the New York Branch have felt increasingly that the time was nearing when the branch should increase its area. It was voted that its territory include the entire Atlantic

seaboard. This is to be construed that it may draw its membership from Florida to Canada, and westward to contiguous territory of whatever branch of the American Psychological Association may exist or may be formed.

At the business meeting the secretary reported that the branch membership numbered 225—the highest in its history. Dr. Samuel W. Fernberger, Pennsylvania, was unanimously elected honorary president for the year 1936-37. Directors elected were: D. H. Fryer, New York University, 1936-39; C. J. Warden, Columbia University, 1936-39; P. M. Symonds, Columbia University, 1936-38. The directors announced the appointment of the following committees: *Program Committee*—C. W. Bray, Princeton University, *chairman*; G. W. Hartmann, Pennsylvania State College; T. W. Forbes, New York State Psychiatric Institute; *Nominating Committee*—H. Helson, Bryn Mawr College, *chairman*; T. M. Abel, Progressive Education

Association; I. Lorge, Teachers College, Columbia University. The invitation of Vassar College to hold the annual spring meeting of the branch in April, 1937, at Poughkeepsie, N. Y., was accepted.

The program occupied three morning sessions and three afternoon sessions. The topics of the sessions were: "Sensation and Perception," "Comparative Psychology," "Mental Testing," "Physiological Psychology," "Child and Abnormal Psychology," "Memory and Learning."

A round-table discussion on "Introspective Techniques" was held. The chairman, Professor E. S. Robinson (Yale University) opened the session with a short historical discussion of the various meanings of the term "introspection," and by pointing out that quarrels regarding the proper meaning of the term had rendered it almost useless. He stated that Professor Bentley and others had attempted to substitute a new terminology, but that such a word as Bentley's "inspection" had not succeeded in becoming current. In opening the floor for discussion the chairman suggested that so far as possible the meeting be governed by a common-sense definition covering any form of self-observation. Professors Weld (Cornell University) and Fernberger (University of Pennsylvania) began the discussion by asserting the continued importance of self-observation in the psychological laboratory. They claimed that, whatever theoretical difficulties may have arisen with the definition of introspection, observation on the part of the subject had continued to play an important rôle in psychological experimentation. In connection with these remarks the question was raised as to whether expert training is a requisite of competent introspection. Those who commented on this question seemed to feel that such training was necessary in connection with certain introspective problems. It was pointed out, however, that important discoveries regarding the human mind had been made by Freud and others through the use of a very informal type of subjective observation. Another question that grew out of the discussions by Professors Weld and Fernberger dealt with the difference between human introspective experiments and certain experiments on the sensory discrimination of animals. There was some disagreement as to whether animals in such experiments do in fact introspect. Professor Fryer

(New York University) asked for a discussion of the possibility of a quantification of introspective reports, particularly as they are elicited in studies of personality problems. These remarks called out a considerable number of comments regarding the usefulness of introspection in a variety of personality studies, but without focussing the issue.

Dr. Joseph Jastrow presided at the dinner meeting. President Aloysius J. Hogan, S.J., of Fordham University, welcomed the group, and Professor Herbert S. Langfeld, Princeton University, delivered the honorary president's address on "The Place of Esthetics in Social Psychology." The gist of his address follows: It appears that esthetics has been somewhat neglected in social psychology. The main thesis of the address, therefore, was to emphasize the importance of artistic creation as a unique form of social communication, since man is able to express his personality more completely through the medium of art than in any other way. The difference between art and play was discussed and it was shown that, paradoxical as it might seem, the desire for social communication and approval is more fundamental to the former than to the latter. The artist is always consciously or subconsciously desirous of some kind of an audience, while there are forms of play in which the individual is self-sufficient. Some of the methods by which the artist achieves self-expression through esthetic forms, such as line and color, were described. It was pointed out, however, that pure form in the visual arts is apt to lead to an abstract and in consequence ineffectual art. Criticism was also directed against the modern tendency to represent the individual's subjective thought processes on the ground that images in themselves can rarely be a vehicle for successful communication. The psychological fallacy of writings such as Gertrude Stein's was also explained. It was shown further, however, that the artist is often compelled to break through the conventional way of perceiving things, as for example in regard to the constancy of objects, in order to give a satisfactory representation of the world as it is experienced. Finally the lag in regard to taste and the necessity for a gradual adaptation toward industrial art forms was discussed.

HERBERT W. ROGERS,
Secretary-Treasurer

SPECIAL ARTICLES

THE CARCINOGENIC EFFECT OF A VIRUS UPON TARRED SKIN

SHOPE showed in 1933¹ that the cutaneous papillomas common in western cottontail rabbits (*Sylvilagus floridanus*, Allen) are caused by a virus. The

¹ R. E. Shope, *Jour. Exp. Med.*, 58: 607, 1933.

growths exhibit the traits which are characteristic of tumors in general,² but differ from these in the important respect that they are manifestly infectious in origin under natural conditions. Inoculation of the

² Peyton Rous and J. W. Beard, *Jour. Exp. Med.*, 60: 701, 723, 741, 1934.

virus into domestic rabbits (Genus, *Oryctolagus*) results in papillomas of notably aggressive behavior, which frequently become cancerous within a few months.³ The metastasizing, highly malignant carcinomas that develop then are the outcome of changes in the virus-infected epithelium which are conditional upon various favoring circumstances. The precancerous period of papillomatosis can be much shortened by stimulative procedures, but it has not been done away with entirely by such means, nor has malignancy been induced by introducing extracts of the cancers into normal skin.

The papilloma is formed by multiplication of the epidermal cells with which the virus becomes associated at the time of inoculation, and it is essentially a composite of cell "families," a fact often evident in its aspect. Cancer arises more frequently from some of these families than from others within the same growth. In order to provide a wide range of cell conditions at the time of the initial cell-virus association, as also to give opportunity for any individual differences in the virus entities to assert themselves, advantage has been taken of the tendency of the virus to localize in hyperplastic epidermis.² The hyperplasia was secured by tarring the ears of rabbits. After 1½ to 3 months of tarring, when tar papillomas had begun to appear, a large amount of a Berkefeld filtrate, containing active virus, was injected into a leg vein. During the next two weeks—the incubation period of the virus—no significant local changes took place, though some of the growths due to the tarring continued to enlarge slowly, and a few others sometimes appeared. Then in many of the rabbits the growths underwent extraordinary alterations, becoming within a few days discoid, beefy and infiltrative, while many new and similar ones developed. Soon low mounds or ill-defined swellings appeared opposite certain of the tumors, as also elsewhere on the outer side of the ears. The tarring was now discontinued, yet the tumors continued to enlarge; some of the outer swellings ulcerated; the ears became greatly thickened, nodular and distorted, and their hollows filled with coalescing masses of fungoid tissue. These changes usually occupied but a few weeks, and rapidly led to death. Biopsies disclosed the presence at an early period of numerous, discrete, highly anaplastic carcinomas, which frequently had extended through the lacunae in the cartilaginous sheet, causing the ulcerations on the outer side of the ears. Some of the malignant growths developed on the basis of pre-existing tar papillomas but others where none had been visible. In an instance of the latter sort anaplastic cancers 3 mm and 4 mm across developed within 22 days after

the virus inoculation. Only where the skin had been tarred did tumors appear.

Most of the nodular or fungous thickening of the ears proved due to growths expressive of the various stages in the transformation of virus-induced papillomas to anaplastic, squamous-cell carcinomas.³ One could discern, crowded and intermingled in the masses of actively proliferating tissue, benign papillomas, others that were cystic or complicated in pattern and of dubious import, yet others that were frankly invasive and destructive, and carcinomas of all degrees of malignancy. Sections taken early have shown that some of the latter were anaplastic from the beginning.

Many of the benign papillomas could be identified by their slaty hue as due to the action of the virus. Save when they were heavily pigmented, as in these cases, they could not be told from papillomas due to tarring. Indeed all the growths which developed after the virus injection were found to have their counterpart amongst the tumors which develop in rabbits that have been tarred for long periods. Yet the tar tumors can scarcely be caused by the virus now under consideration, or another antigenically related to it, for the blood serum of rabbits carrying tar papillomas does not neutralize the virus *in vitro*, whereas that from animals with virus-induced papillomas usually possesses this power.

In supplementary tests rabbits that had been tarred for many months, with many large and small papillomas in consequence, were injected with the virus intravenously. Again events took the course described. A curious feature was the development of numerous tumors from the hyperplastic epithelial layer covering large, rounded, fleshy, tar papillomas that consisted for the rest of connective tissue. These soon became studded with growing bosses, and were replaced as the new tumors invaded their substance.

The literature on the effects of tarring the ears of rabbits yields no examples of fulminant carcinosis such as are here reported, nor have any been observed in the numerous control animals of the present work.

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ISOLATION OF CRYSTALLINE PEPSINOGEN FROM SWINE GASTRIC MUCOSA AND ITS AUTOCATALYTIC CONVERSION INTO PEPSIN

LANGLEY in 1882¹ observed that slightly alkaline extracts of swine gastric mucosae contained a material which was not pepsin but which could be converted into pepsin upon acidification of the extract.

¹ J. N. Langley, *Jour. Physiol.*, 3: 246, 1882.

³ *Ibid.*, 62: 523, 1935.

This material (pepsinogen or propepsin), which can be converted into pepsin, has been isolated in crystalline form. It is a colorless protein crystallizing in very fine needles from slightly more than 0.4 saturated ammonium sulfate solution at pH 5.2-5.6. Starting with five independent lots of swine gastric mucosae, crystals have been obtained in each instance, and in one case recrystallization was fractionally repeated three times. The optical rotation and specific proteolytic activity² were the same for all crystalline preparations.

Pepsinogen does not clot milk at pH 5.0 nor liquefy gelatin at pH 4.7, although pepsin has marked activity under these conditions.

Pepsin prepared by the acidification of pepsinogen has been crystallized twice and its crystalline form is indistinguishable by inspection from pepsin crystallized from commercial pepsin by the method of Northrop.³ The optical rotation and specific proteolytic activity² are nearly the same for the two pepsin preparations.

The conversion of pepsinogen into pepsin at pH 4.6 is an autocatalytic reaction similar to the previously described autocatalytic conversion of trypsinogen into trypsin.⁴ Since the conversion is caused by the active enzyme and since no linkage but peptide linkages are known to be split by pepsin, it seems probable that the change involves the rupture of a peptide linkage, although little if any non-protein nitrogen is liberated during the conversion.

The procedure used in crystallizing pepsinogen may be summarized as follows:

(1) Minced swine fundus mucosae extracted with 0.45 saturated ammonium sulfate in M/10 sodium bicarbonate; filtered after the addition of 10 per cent. Filter Cel and 5 per cent. Hyflow Super Cel.⁵

(2) Pepsinogen precipitated from 0.7 saturated ammonium sulfate.

(3) Pepsinogen adsorbed from solution at pH 6.0 by cupric hydroxide suspension and eluted in M/10 pH 6.8 phosphate.

(4) Treatment with cupric hydroxide repeated.

(5) Soluble carbohydrate remaining removed by treatment with Filter Cel at pH 7.0.

(6) Pepsinogen crystallized in fine needles over night at 10° C., 0.4-0.45 saturated ammonium sulfate and pH 5.2-5.6 (orange red to methyl red).

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FOR MEDICAL RESEARCH

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² By "specific proteolytic activity" is meant the activity per milligram of protein nitrogen. The activities were determined by the hemoglobin method.

³ J. H. Northrop, *Jour. Gen. Physiol.*, 13: 739, 1930.

⁴ M. Kunitz and J. H. Northrop, *SCIENCE*, 80: 505, 1934.

⁵ Johns-Manville products.

SELENIUM AND DUCK SICKNESS

SELENIUM in varying concentrations has been known to exist for some time in certain marginal and submarginal areas. It has been found not only in the soil of these areas but also in the vegetation in varying quantities from mere traces to high concentrations.¹ Occurring in grains and grasses in some localities, it has been believed to be a source of chronic and acute disease (formerly known as "alkali disease") among live stock.

Because of the marked similarity of the effects of toxic grains known to contain selenium on experimental animals, as studied by Franke and colleagues,² and others,³ which show symptoms very closely related to those of duck sickness, it is possible to consider selenium as a cause of duck sickness. In general, the range of duck sickness has been confined to regions of alkaline waters of western United States and Canada which are characterized by marshes, mud-flat areas and overflowed lands.⁴ Greatest concentrations of selenium have occurred during dry years and in areas identical with those in which great numbers of migratory waterfowl have perished.

Although the evidence for botulinum poisoning as the causative factor⁴ is considered valid, it seems desirable in the light of recent work to thoroughly investigate the possibility of another cause, namely, selenium and salts of related metals. Experiments in which tame and decoy ducks were used show that sodium selenite added to drinking water in concentrations of 50 p.p.m. and above, produce lethal results in about ten to twelve hours, depending upon the amount of water consumed. When 20 p.p.m. sodium selenite were added, death usually followed within fifteen to twenty-four hours. Delayed and less severe symptoms resulted when lower concentrations of the toxic element were added to the water.

It is noteworthy that a definite parallelism may exist between selenium poisoning and the syndrome of duck sickness. A difficulty in respiration was first noticed. This was followed by weakness in the legs as a state of unbalance became apparent. The birds showed difficulty in holding their wings in position and, while resting, would support their heads and necks over their backs with bills resting on their breasts. Watery discharges flowed from the eyes and nostrils and in some cases formed encrustations which partly closed the external openings. A characteristic, green, fluid diarrhea was present in all cases. Subnormal body temperatures (100 degrees F.), followed by rapid drop as low as 96 degrees F. just before

¹ H. G. Byers and H. G. Knight, *Ind. and Eng. Chem.* 27: 902, 1935.

² U. S. D. A., Circular 320, August, 1934.

³ O. A. Beath, J. H. Draize, H. F. Eppson, C. S. Gilbert, and O. C. McCreary, *Jour. Amer. Pharm. Assoc.*, 23: 94, 1934.

⁴ U. S. D. A. Bull. 411, May, 1934.

death, accompanied the sickness. The last stage was characterized by complete prostration, in which the neck and head were stretched out flat on the floor of the cage. Post-mortem examinations revealed slight congestion of blood vessels of the small intestine and in some cases an indication of a hemorrhagic condition of the cerebellum.

These experiments show that low concentrations of

selenium produce poisoning in ducks in which the syndrome is identical with that produced by *Clostridium botulinum* type C.* This would indicate that selenium may be a contributing factor in duck sickness. Further experimental work is in progress and a more detailed paper will appear at a later date.

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SCIENTIFIC APPARATUS AND LABORATORY METHODS

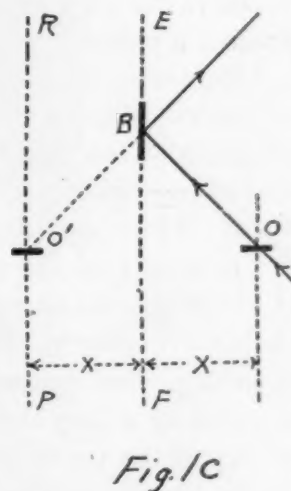
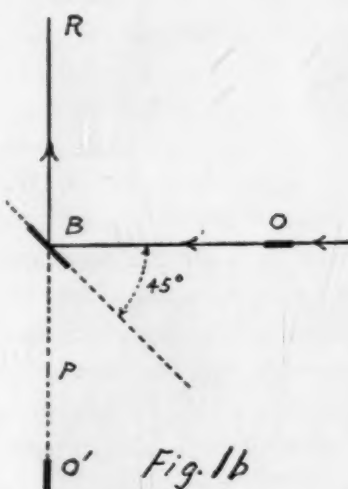
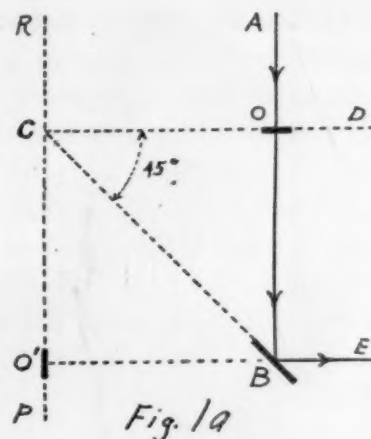
OPTICAL DESIGNS FOR OBSERVING OBJECTS IN CENTRIFUGAL FIELDS OF FORCE

HARVEY¹ has described an optical design of a microscope centrifuge employed in investigating the effects of high centrifugal forces on small organisms. The general design, which makes use of two mirrors mounted on the rotor, is applicable to the study of other materials under like conditions. When it is desirable to view the effects from a direction parallel to the axis of rotation and when in addition it is necessary to observe elements of the object more widely separated in that direction than at right angles thereto, the Harvey arrangement is ideal.

Another simpler design employing only one mirror has been found to give greatly improved optical definition when these elements are least widely separated in a direction parallel to the axis. In Fig. 1a, for example, the disk-shaped object O has a diameter large in comparison with its thickness along AB, parallel to the axis of rotation RP. B is a small plane mirror mounted on the rotor. (The same applies to the other figures.) Light from a straight filament lamp is focused upon O so that the image of the filament lies along CD and consequently transverse to the direction of the motion of the object thus illuminated. As O then revolves about RP, it becomes visible to the naked eye or in a microscope only as it passes through the indicated position. Consequently, as viewed from E the virtual image O' will appear stationary and under apparently continuous illumination when the speed is high enough to prevent flicker. As the light beam passing through O is made wider, the optical definition becomes poorer. Further consideration will show that "perfect" definition is obtained only for points along the line CD in the design described, and only for one point at a time along the line AB in the Harvey design. The reason is that,

in the respective designs, these two lines are the only ones whose virtual images in the field of view lie coincident with the axis of rotation.

Fig. 1b illustrates another method that may be used to observe in a radial direction the real image of the filament being vertical here. Furthermore, it will be noticed that B can be placed at any position along RP as long as it is so tilted that the image O' will lie



somewhere along RP. Fig. 1c shows an arrangement for viewing the object obliquely. In fact, the mirror may be placed anywhere in the plane perpendicular to the plane of the figure intersecting it in EF. In general, there are an infinite number of possible positions for the mirror, the only necessary condition

¹ J. Frank Harvey, *Journal of the Franklin Institute*, 214: 1, 1932.

being that the virtual image of the object shall lie at the axis of rotation.

The arrangements shown in Figs. 1a and 1b have been used with good success in simple air-driven microscope centrifuges.²

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A PIEZOELECTRIC ULTRAMICROMETER

THE ultramicrometer is an instrument for the measurement of linear displacements smaller than those accessible by the methods of optical interferometry, which are limited by the wave-length of light. Whiddington,¹ using two oscillating electrical circuits tuned so as to produce an audible beat-tone, was able to extend the sensitivity of measurement to a value somewhat smaller than 10^{-8} cm. This was accomplished by the measurement of the variation of beat-tone between the two circuits, this variation being a measure of the change of frequency produced in one of them by the change of capacity of its condenser caused by alteration of distance between condenser plates. Another method consists in exciting a resonant circuit by an oscillator at such a frequency that the response of the resonant circuit is most sensitive to a variation of exciting frequency; the amplitude of current in the resonant circuit will then register a change caused by a shift in frequency, as that produced by a change in distance apart of the plates of a condenser in the exciting circuit. This method, with especially designed circuits, has been developed at the Bell Telephone Laboratories for the measurement of displacement of microphone contacts,² the sensitivity being such that a displacement of a condenser plate by 10^{-8} cm could produce a galvanometer deflection of one inch.

A piezoelectric quartz plate provided with suitable electrodes is the equivalent of a resonant electrical circuit, and the properties of such plates have been studied extensively by W. G. Cady³ and by D. W. Dye.⁴ When the plate electrodes are connected to the terminals of the condenser in a simple resonant circuit which is being excited by an external source of variable frequency, the response curve (*e.g.*, effective current plotted against frequency) of the circuit is modified by a deep cleft or *crevasse* at the natural frequency of the quartz plate. This *crevasse* is extraordinarily narrow and its sides are so steep that if the operating frequency of the exciting circuit be set so as to correspond to a point of the steepest slope, a

small change of the exciting frequency will cause a correspondingly large change in the oscillatory current in the resonant circuit connected with the quartz, and a thermogalvanometer in this circuit will register a corresponding change of reading. In general, changes of frequency much too small to be detected by usual methods will cause a measurable change in the galvanometer reading.

Using a quartz plate of 600 KC resonant frequency, a frequency change of one sixtieth of a cycle per second may be detected, corresponding to a frequency change of about three parts in one hundred million. Such a change in frequency may be caused by a minute change in the distance between the plates of a condenser in the exciting circuit. The practical limits to which measurements may be pushed depend upon the stability of frequency of the exciting circuit and upon the freedom from minute mechanical disturbances of the small condenser, the displacement of one plate of which is to be measured. To test the method a micrometer condenser has been constructed so that each plate is attached to a separate support clamped to a heavy steel rod. Adjustments are provided for making the plates parallel and for making relatively large variations of plate distance by means of a micrometer screw. Additional known micro-variations of plate distance are made by applying small known bending forces to the steel rod. A variable condenser in parallel is provided so as to operate the micrometer condenser at any desired plate distance and thus to secure a wide range of sensitivities. In the experiments which have so far been carried out displacements of 10^{-9} cm have been measured to a few per cent., though no special precautions have been taken against mechanical disturbances. By taking such precautions it is expected that displacements of 10^{-10} cm may be measured. The attainment of a sensitivity of this order should open a new avenue of approach to a number of important problems.

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